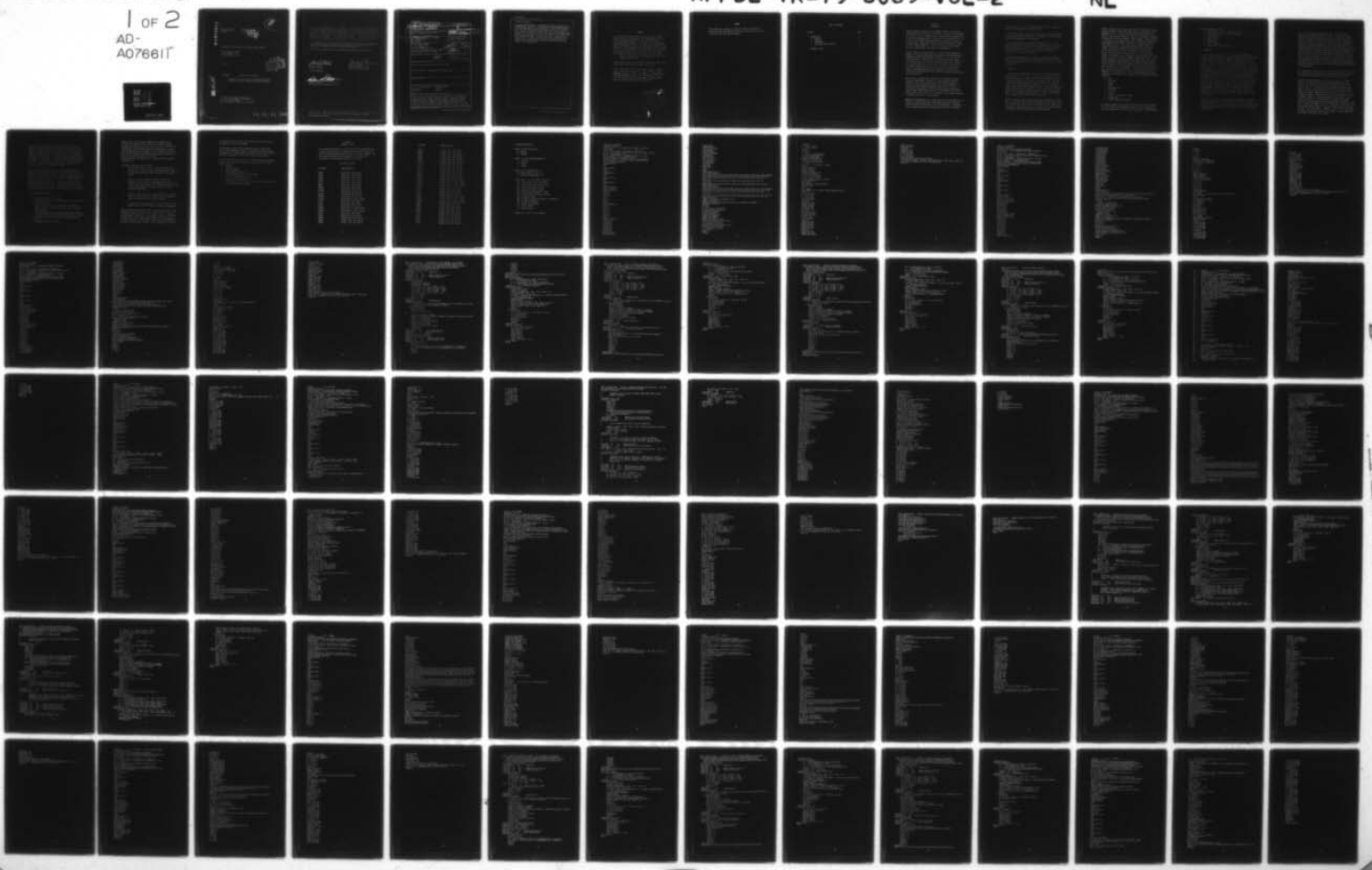
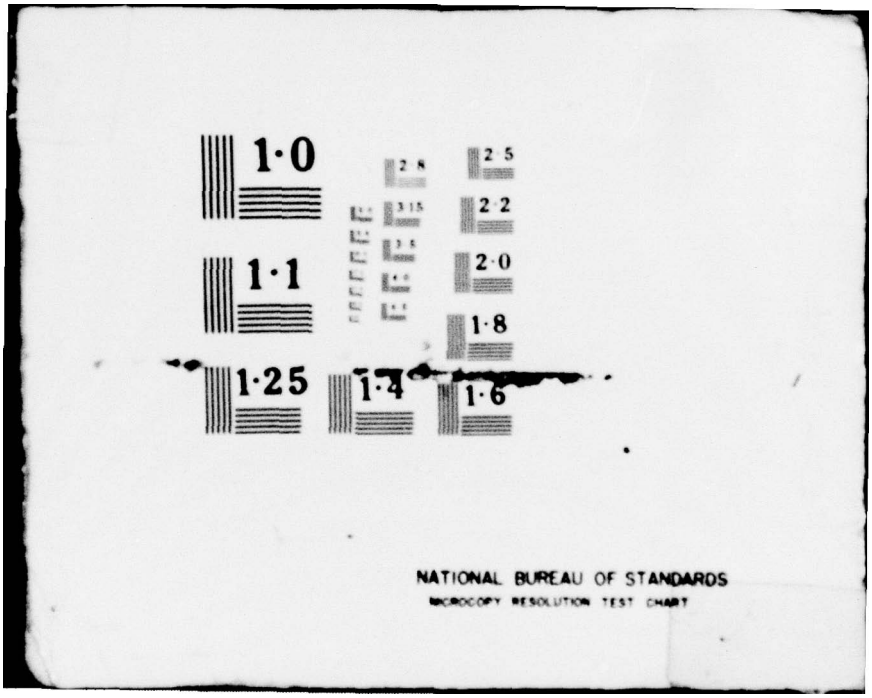
AD-A076 611 BOEING AEROSPACE CO SEATTLE WA F/G 1/3
NEW REMOTELY PILOTED VEHICLE LAUNCH AND RECOVERY CONCEPTS - COM--ETC(U)
JUN 79 S J BAUMGARTNER , R F YURCZYK F33615-78-C-3404
UNCLASSIFIED AFFDL-TR-79-3069-VOL-2 NL

1 OF 2
AD-
A076611




1·0
1·1
1·25
1·4
1·6
1·8
2·0
2·2
2·5
NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

AFFDL-TR-79-3069
VOLUME II

NEW REMOTELY PILOTED VEHICLE LAUNCH AND RECOVERY CONCEPTS

Boeing Aerospace Company
P. O. Box 3999
Seattle, Washigton 98124

JUNE 1979

Final Report March 1978 - March 1979

Approved for public release; distribution unlimited

Air Force Flight Dynamics Laboratory
Air Force Wright Aeronautical Laboratories
Air Force Systems Command
Wright-Patterson Air Force Base, Ohio 45433

NOTICE

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

This reports has been reviewed by the Information Office (IO) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical reports has been reviewed and is approved for publication.

DAVID L. FISCHER, 2Lt, USAF
Project Engineer
Mechanical Branch

HOWELL K. BREWER
Chief, Mechanical Branch
Vehicle Equipment Division

FOR THE COMMANDER

AMBROSE B. NUTT
Director, Vehicle Equipment Division

Copies of this report should not be returned unless return is required by security considerations, contractual obligations, or notice on a specific document.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: AFFDL-TR-79-3069 — Volume II	2. GOVT ACCESSION NO.
	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): New Remotely Piloted Vehicle Launch and Recovery Concepts - Computer Program Listings, Volume II.	5. TYPE OF REPORT & PERIOD COVERED: Technical — Final, March 1978 — March 1979
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): G. J. Baumgartner, G. Brister, K. Rajpaul, Roger F. Yurczyk	8. CONTRACT OR GRANT NUMBER(s): F33615-78-C-3404
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Boeing Aerospace Company, P. O. Box 3999, Seattle, Washington 98124	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 2402-01-08, 17 01
11. CONTROLLING OFFICE NAME AND ADDRESS: Air Force Flight Dynamics Laboratory (FEMB), Wright-Patterson AF Base, Ohio 45433	12. REPORT DATE: June 1979
	13. NUMBER OF PAGES: 166
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office): 173	15. SECURITY CLASS. (of this report): Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Air Cushion Landing System
Air Bag Skid
EASY Program
RPV
Dynamic Analysis
Launch
Recovery

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Dynamic analysis, preliminary design, and performance/cost trade studies of air bag skid and air cushion concepts for launch and recovery of Boeing and Rockwell advanced RPV concepts have been conducted. Dynamic analysis was performed using the six degree-of-freedom computer program EASY. Dynamic simulations included perturbations to steady state flight, landing, and takeoff simulations. Launch and recovery concepts investigated were air bag skid system, air cushion recovery system, integrated air cusnion system, and

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

059 610

ABSTRACT (Continued)

air cushion launch platform. Performance/cost trade study factors investigated were complexity, fuel requirements, adverse weather capability, ground equipment and facility requirements, survivability/vulnerability, reliability and maintainability, and system acquisition and life cycle costs. Results of the study indicated that an air cushion system is a feasible means of recovery of an RPV such as the Boeing and Rockwell ARPV concepts. An air bag skid with an arrestor system is a feasible approach when minimum field length is a major design factor. Integrated air cushion systems for launch and recovery are greatly affected by engine characteristics. In each case, the launch and recovery systems are shown to be an integral part of the total vehicle design and strongly influences the airframe design.

FOREWORD

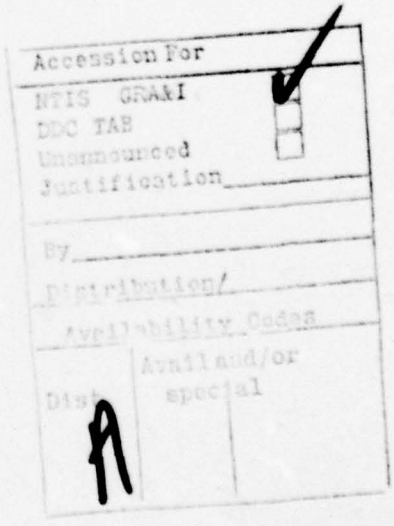
This report describes research work performed by The Boeing Company, Boeing Military Airplane Development, Seattle, Washington, for the Air Force Flight Dynamics Laboratory, Air Force Wright Aeronautical Laboratories, Wright-Patterson Air Force Base, Ohio. The program was funded by the Laboratory Director's Fund under Contract F33615-78-C-3404, Project 2402. Project engineers for the contract were Peters Skele and Lt. David L. Fischer, AFFDL/FEM. This research work is part of an effort to obtain new launch and recovery concepts for improving the effectiveness of remotely piloted vehicles. This report is in two volumes:

I Analysis, Preliminary Design and Performance/Cost Trade Studies

II Computer Program Listings

The work reported herein was performed during the period 15 March 1978 to 15 March 1979, and the report was submitted 16 April 1979.

Vinod K. Rajpaul served as the program manager. Roger F. Yurczyk was principal investigator for the technical work, assisted by Steven J. Baumgartner and James G. Brister. Other members of the Boeing Military Airplane Development assisting in this investigation included Daniel Tracy, Phil Gotlieb, Peter Milns, Ralph Rankin, John Munnis, Robert Brown, Richard Newton, Theresa Gnagy and Jeanne Owens.



SUMMARY

The purpose of this volume is to provide listings of the EASY ACLS programs that were developed and used in the simulation studies of the various RPV launch and recovery concepts.

TABLE OF CONTENTS

SECTION I
INTRODUCTION

Current concepts of warfare call for remotely piloted vehicles (RPV) to perform certain high risk missions that have, in the past, been performed by piloted aircraft. The capabilities of these vehicles in conventional warfare have been demonstrated in Southeast Asia and the Middle East. As a result of this demonstrated capability and of conceptual studies that have been done, ground based RPV systems are being considered as part of an overall defense capability. The role of the RPV includes weapons delivery, reconnaissance, and electronic countermeasures.

Studies of RPVs in these multimission roles by The Boeing Company and Rockwell International under contracts sponsored by the USAF Aeronautical Systems Division RPV SPO (References 1 and 2, Vol. I of this report) developed potential configurations for an advanced RPV system (ARPV). In this program, many system configurations were investigated in terms of mission requirements and life cycle cost. Because of the multimission requirement, subjective weight factors given to various performance factors, and the degree to which site preparation, logistics, and vulnerability were considered, widely differing systems were presented by the two contractors.

Boeing studies conducted under the ARPV contract (F33615-75-C-0516) resulted in the proposal to use an air bag skid recovery system in conjunction with a ground based arrestor cable device (Reference 1). Similarly, studies conducted by Rockwell on a RPV for the same multimission role (Contract F33615-75-C-0518) evolved a conventional tricycle type landing system, also used in conjunction with a ground based arrestor cable installation for recovery. These systems are shown in Figures 1 and 2, Vol. I of this report.

Meanwhile, the technology of air cushion vehicles has been advancing at a high rate in the past ten years and has been studied as a launch and recovery concept for RPVs as well as for piloted aircraft. Prototype air cushion systems have been built and tested for the Australian target

drone, the Jindivik, and for the XC-8A DeHavilland Buffalo, a medium size (40,000 pound gross weight) turboprop transport.

The launch and recovery systems selected in the ARPV studies were based on limited trade studies and analyses. The dynamics of recovery systems and their deployment were not investigated.

In the Boeing ARPV Trade Study Document (Reference 1, Vol. I of this report) it was noted that while the tail hook/arrestor cable and air skid system represented an attractive low life cycle cost concept, further investigation of the air vehicle/recovery system dynamics would be required to fully validate the concept.

Since the effectiveness of RPVs in performing its missions depends, in part, on the launch and recovery techniques employed, a second look at the factors that determine the rank of these various systems on the ARPV is appropriate.

1. OBJECTIVE

Establishing the effectiveness of these launch and recovery systems was the objective of this study. Specifically, the objective was to perform dynamic analysis, design and cost and performance trade studies of two launch systems and three recovery systems for RPVs. Two generic launch and/or recovery system types were considered. These were the various air cushion systems and the inflatable air bag skid concept. The launch systems include the integrated air cushion system (IACS) which is used for both launch and recovery, and the air cushion launch platform (ACLP). The recovery systems include the air bag skid systems (ABSS), the air cushion recovery system (ACRS), and the IACS.

Recovery of the Boeing ARPV concept was analyzed with the ABSS and the ACRS. The Rockwell ARPV concept was evaluated for launch and/or recovery with the IACS, ACLP, ABSS and ACRS. The Rockwell vehicle concept with conventional landing gear was used as a baseline in cost and performance trade studies of the different systems that were analyzed.

Dynamic simulation of the vehicles with the various launch and recovery concepts was made using the EASY Dynamic Analysis Program described in Reference 3, Vol. I. The Basic EASY program was developed by Boeing under Air Force contract F33615-74-C-3041 to provide a means of modeling and analyzing aircraft environmental control systems. The EASY program is a general purpose program for the linear and nonlinear analysis of system dynamics using classical techniques. Through a series of Air Force funded contracts, it has been expanded to model a variety of systems, including environmental control systems, aircraft flight controls and dynamics, space vehicle dynamics, electrical power generation, rapid transit vehicles as well as air cushion landing systems. The program is user oriented and allows the generation of new systems by calling a variety of components from the user library. The special component library developed for the simulation of Air Cushion Landing and Takeoff Systems under contract F33615-77-C-3054 includes a rigid six degree-of- freedom airframe which can be perturbed with all normal aerodynamic forces and moments. The library includes a wind gust model, engine, terrain and an aircraft flight and ground controller. Components for the simulation of a simple aerodynamic control surface system are also included. The air cushion library components include the following:

- Ducts
- Flow splits
- Merges
- Valves
- Centrifugal Fan
- Axial Fan
- Ejector
- Inelastic Trunk and Air Cushion
- Air Bag Skid
- Elastic Trunk and Air Cushion

An arresting system including a hook, cable and water twister component is also available from the component library. The user can generate additional components by writing a Fortran subroutine. Program response

to execution commands include:

- o Steady State Analysis (Single Point or Scan)
- o Time History Simulation (Linear or Nonlinear)
- o Linear Analysis
- o Stability Matrix
- o Eigenvalues
- o Stability Margin
- o Bode, Nyquist, and Nichols plots

2. BACKGROUND

The Air Bag Skid System is a recovery concept which employs two parallel inflatable membranes or bags along the underside of the fuselage to absorb the aircraft vertical component of kinetic energy, and to provide support during landing slideout and arrestment. The skids are stowed in a collapsed state against the fuselage during flight, and have hard smooth covers or doors to reduce aerodynamic drag and to protect the skid bag material. During landing approach, a control signal activates a cold gas generator which causes the covers or doors to open and the skids to inflate. The covers/doors may drop off or may be retained to provide a wider upper surface for the skids to react against for additional stiffness or roll stability. Each skid has a relief valve to limit peak loads and provide damping upon landing impact. The airframe has a tail hook to engage a cable arresting device installed in the landing area. A rather precise guidance/control system is required in order to ensure hook engagement. An overrun barrier is installed at the end of the recovery area to provide for missed or failed cables. Tow away for turnaround is accomplished by attaching wheels to hard points designed for that purpose.

The skids can be designed as prepacked modules attached to and removed from the fuselage by quick disconnect devices to facilitate vehicle turnaround time. The cold gas generator can be sized to accommodate some bag leakage from damage which may be incurred inflight (battle damage) or during recovery.

The Air Cushion Recovery System employs an air cushion designed specifically for landing impact and slideout. The cushion is stowed against the fuselage, with hard covers or doors to reduce drag and protect the cushion. The doors may be used to provide a larger cushion base or to increase roll stiffness. The trunk is usually inflated by diverting air from the compressor section of the thrust engine. The forward one-third of the trunk length has nozzles or holes which serve to provide lubricity in that area, alleviating a "plowing in" tendency. The trunk contact area is covered with an abrasion resistant, high friction material to provide drag to halt the vehicle. Relief valves to reduce impact loads may be employed. The aircraft is towed away for turnaround by a vehicle with an air supply for both the trunk and cushion cavity. No external arresting system is required although one may be employed to reduce the required field length. A final crash barrier may be installed for safety reasons.

The Integrated Air Cushion System is one that provides an air cushion for both the takeoff and landing phases of the aircraft mission. There are two variations, the one trunk concept and the two trunk concept.

The One Trunk Concept employs a single trunk of elastic or inelastic material, to provide both the takeoff and landing functions. Upon rotation, the trunk retracts against the fuselage in the case of the elastic trunk, or is retracted into the fuselage and hard doors close upon it to reduce drag and protect the trunk. Since a large airflow is required for takeoff (compared to landing), a device, such as a tip turbine fan powered by engine bleed air or an auxiliary power unit (APU), is needed to draw in air from the atmosphere for trunk flow. Trunk nozzle configuration is dictated primarily by takeoff requirements resulting in a distribution of nozzles around the entire periphery of the trunk. Landing requirements result in friction pads in some areas of the trunk contact and the capability to reduce cushion pressure after impact to enable friction pad contact. Remote taxi control is a possible design variation if the required thrusters are included. Parking bladders may be included for long term static support.

The Two Trunk Concept employs a jettisonable takeoff trunk and a prepacked landing/recovery trunk. The takeoff trunk may have parking bladders and a nozzle pattern similar to the pattern for the one trunk concept. The takeoff trunk is recovered after it is jettisoned and attached to a new aircraft for a subsequent launch. The takeoff trunk configuration and attachment is such that a clean aerodynamic surface is left when it is jettisoned. The stowed landing trunk is now identical to the Air Cushion Recovery System defined earlier, except that excess airflow is available due to takeoff requirements.

The Air Cushion Launch Platform is a launching system that uses a separate air cushion equipped carriage to support the aircraft during takeoff. Upon rotation, the platform is released from the aircraft and is stopped by internal braking or by an external arrestment system. The platform is recovered by either a tow vehicle or by remote control if appropriate thrusters are provided. The platform contains its own air supply and can be designed to carry an additional thrust engine to aid the aircraft engine during takeoff. Parking bladders are incorporated to provide platform and aircraft support while the air supply is turned off.

3. SCOPE AND GENERAL APPROACH

This program consisted of the following:

- Familiarization with mission requirements and the previous ARPV conceptual studies.
- Preliminary configuration and assessment of parameters for dynamic modeling of the vehicles with the various launch and recovery concepts.
- A six degree-of-freedom, rigid body airframe dynamic analysis for each configuration using the EASY dynamic analysis program.
- Preliminary design to identify system performance and cost factors.
- Performance and cost trade study.

Figure 3, Vol. I of this report, summarizes the combinations of configurations that were studied using the EASY dynamics program. Considering the elastic and inelastic trunk versions of the one trunk integrated air cushion system as separate configurations, a total of eight configurations were evaluated. Four of these were for recovery only, one for launch only, and three for both launch and recovery. In addition, the clean configuration of both the Boeing and Rockwell RPVs were studied to determine basic aerodynamic characteristics.

The dynamic simulation studies included:

- Vehicle flight stability analysis with the landing system deployed for all launch recovery system combinations. Vehicle parameter adjustments were made as required for most stable flight.

- Landing simulation, encompassing approach, bag or trunk deployment, flare, touchdown and arrestment or braking for all landing system configurations. The study determined vehicle and landing system parameter adjustments required to achieve satisfactory performance.

- Takeoff or launch simulation including takeoff roll, rotation, platform or trunk release, and climbout for the integrated air cushion configurations plus the launch platform.

- Arrestor hook-cable dynamic analysis to define limits of hook properties and aircraft kinematics for proper hook engagement.

Design modifications were made for each airframe/launch/recovery system combination based on the results of the dynamic analysis. The basic airframe designs as described in the conceptual studies for the Boeing and the Rockwell vehicles were used for appropriate modifications to incorporate the results of the dynamic analysis and the requirements of the various launch/recovery systems. Design considerations for each of

the concepts included survivability/vulnerability aspects and ground equipment and facilities requirements.

A performance/cost analysis was performed on each airframe/launch/recovery system combination shown to be acceptable by dynamic analyses. Performance/cost increments were made using the Rockwell ARPV design as described in Reference 2, Vol. I of this report, as a baseline.

The following factors were considered in the performance/cost tradeoffs, but only to the extent as they effect or are affected by the launch/recovery systems:

- o Complexity
- o Fuel requirements
- o Adverse weather capability
- o Ground equipment and facility requirements
- o Survivability/vulnerability levels
- o Reliability and maintainability
- o System acquisition and life cycle costs, including those related to site preparation and upkeep.

SECTION II
PROGRAM LISTINGS

The following table contains a list of the EASY ACLS programs which are included in this section. The programs were developed and used in the simulation studies of the various RPV launch and recovery concepts. The table shows the purpose of each program and its file name. An explanation of the file naming conventions is included.

EASY ACLS Programs

File Name	Type of Analysis
BDABN2	Boeing ABSS 3 DOF Landing
BDACN2	Boeing ACRS 3 DOF Landing
BDACN3	Boeing ACRS 3 DOF Landing
BDMBN2	Boeing ABSS 3 DOF Landing
BDMCN2	Boeing ACRS 3 DOF Landing
BMDCN3	Boeing ACRS 3 DOF Landing
BDMCN4	Boeing ACRS 3 DOF Landing
BFABD20	Boeing ARPV 6 DOF Inflight
BFATD11	Boeing ARPV 6 DOF Inflight
BFATD20	Boeing ARPV 6 DOF Inflight
BFMTD20	Boeing ARPV 6 DOF Inflight
BLAAS03	Boeing ARPV Air Supply System
BLABA1	Boeing ABSS 6 DOF Landing
BLACA2	Boeing ACRS 6 DOF Landing
BLASB1	Boeing ACRS 6 DOF Landing
BLMAS03	Boeing ARPV Air Supply System
BLMAS04	Boeing ARPV Air Supply System
BLMCA2	Boeing ACRS 6 DOF Landing
BLMSB1	Boeing ACRS 6 DOF Landing
RDABN2	Rockwell ABSS 3 DOF Landing
RDACE2	Rockwell IACS 3 DOF Landing
RDACN2	Rockwell ACRS 3 DOF Landing

File Name	Type of Analysis
RDACN3	Rockwell ACRS 3 DOF Landing
RDMBN2	Rockwell ABSS 3 DOF Landing
RDMCE2	Rockwell IACS 3 DOF Landing
RDMCN2	Rockwell ACRS 3 DOF Landing
RFABD20	Rockwell ARPV 6 DOF Inflight
RFATDT2	Rockwell ARPV 6 DOF Inflight
RFATD1T	Rockwell ARPV 6 DOF Inflight
RFATD13	Rockwell ARPV 6 DOF Inflight
RFATD20	Rockwell ARPV 6 DOF Inflight
RFATT1	Rockwell ARPV 6 DOF Inflight
RFMTD1T	Rockwell ARPV 6 DOF Inflight
RFMTD11	Rockwell ARPV 6 DOF Inflight
RFMTD20	Rockwell ARPV 6 DOF Inflight
RLAAS01	Rockwell ARPV Air Supply System
RLAAS06	Rockwell ARPV Air Supply System
RLAAS07	Rockwell ARPV Air Supply System
RLABA1	Rockwell ABSS 6 DOF Landing
RLACA2	Rockwell ACRS 6 DOF Landing
RLACE2	Rockwell IACS 6 DOF Landing
RLASB1	Rockwell ACRS 6 DOF Landing
RLMAS03	Rockwell ARPV Air Supply System
RLMAS04	Rockwell ARPV Air Supply System
RLMAS07	Rockwell ARPV Air Supply System
RLMBA1	Rockwell ABSS 6 DOF Landing
RLMCA2	Rockwell ACRS 6 DOF Landing
RLMCE2	Rockwell IACS 6 DOF Landing
RLMSB1	Rockwell ACRS 6 DOF Landing
RTACE1	Rockwell IACS 6 DOF Landing
RTALP1	Rockwell ACLP 6 DOF Landing
RTATD2	Rockwell ACTS 6 DOF Landing
RTATD1	Rockwell ACTS 6 DOF Landing
RTMCE1	Rockwell IACS 6 DOF Landing

File Naming Conventions

Column 1 is Vehicle Identifier

- B = Boeing
- R = Rockwell

Column 2 is Flight Condition Identifier

- F = Inflight
- L = Landing
- T = Takeoff

Column 3 is File Type Identifier

- M = Model Generation Input File
- A = Analysis Program Input File

Columns 4 and 5 are File Contents Identifiers

- TS= Trim Evaluation with Trunk Stowed
- TD= Trim Evaluation with Trunk Deployed
- SB= Cushion with Suction Braking
- CA= Cushion with Arrestor System
- BA= Air Bag Skid with Arrestor System
- CN= Cushion without Arrestment or Braking
- AS= Air Supply System
- BN= Air Bag Skid without Arrestment or Aerodynamics
- BD= Air Bag Skid Deployed
- TT= Takeoff Trunk Deployed
- LP= Launch Platform
- CE= Elastic Cushion

Columns 6 and 7 are File Version Numbers

```
TITLE=  FILE BDABN2
PARAMETER VALUES
MA1DL=49.69,C   DL=3.608,XP1DL=0,ISWDL=3,STADL=0
IYYTL=790
XU DL=-.056 ,XA DL= -1.89,XU DL= 0,XDEDL= 0
ZA DL=-3.15,ZADDL= 0,ZQ DL=-2.91,ZU DL=0,ZDEDL=-1.272,
ZD DL= -.765,ZDSDL= -1.0
MD DL= .0206,MALDL= -.15,MADDL=0,MQ DL= -15.66,
MU DL=0,MDEDL= -1.805,MDSDL=2.991
ID1VA=3,IDGVA=6,S  VA=26,VS VA=221.2444,ALSVA=0.
GAXTG=1,GAYTG=0,GAZTG=0,XD TG=0,YD TG=0,ZD TG=0
PW VA=0,QW1VA=0,RW1VA=0
TABLE,A2TTB,2
0,50
0,0
TABLE,A2TTA,2
0,50
1.6,1.6
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE, ABLAB, 3
13,0,31.4,0,90
TABLE, XYZAB, 12
145,2,0
130,2,0
110,2,0
90,2,0
70,2,0
50,2,0
30,2,0
10,2,0
TABLE, DSMAB, 12
10,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
TABLE, IALAB, 16
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
TABLE, RELAB, 4
0,1.1,2.1,100
```

```
0,0,144,144
TABLE,FTAFU2,4
0,15.8,16.8,1000
0,0,144,144
TABLE,FTAFU3,4
0,15.8,16.8,1000
0,0,144,144
TABLE,XYZB,9
95.5,-21.3,14.0
95.5,21.3,14
-50,-48.3,13.5
-50,48.3,13.5
94.4,0,13.5
-92,0,12
TABLE,GAP,3
1,2,3
0,0,0
TABLE,TABEJ1,15,4
1.34,2.02,3.38,5.76
0,1.0,1.02,1.027,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,1.388,10
100,4.06,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
28.3,3.63,3.136,2.86,1.915,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,
-.01,-.01
9.9,2.94,2.77,2.71,2.526,2.42,2.334,1.816,1.01,.432,-.01,-.01,-.01,
-.01,-.01
3.8,2.53,2.5,2.49,2.46,2.43,2.4,2.29,2.11,1.98,1.89,1.38,1.01,-.01,-.01
TABLE,TABEJ2,15,4
1.34,2.02,3.38,5.76
0,1.0,1.02,1.027,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,1.388,10
100,4.06,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
28.3,3.62,3.136,2.86,1.915,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,
-.01,-.01
9.9,2.94,2.77,2.71,2.526,2.42,2.334,1.816,1.01,.432,-.01,-.01,-.01,-.01,-.01
3.6,2.53,2.5,2.49,2.46,2.43,2.4,2.29,2.11,1.98,1.89,1.38,1.01,-.01,-.01
PARAMETER VALUES
XTROL=-.0156,MALOL=.25,MTROL=-.0079
FINMA E=0,FINMA T=0
REARMU=.7,FRONTMU=.7,RVCRP=1.5,RVSATP=2.5,RVAREA=144.,KOUNT=1
AMASS=49.7,TSWITCH=1
AN FU2=1
AN FU3=1
PA AB=14.7,VU AB=6,EPCAB=1
NE AB=-8,NSTAB=1,NPTAB=10
BSTAB=296,WLTAB=85.5
CD1AB=.6,CDAAB=.9
BSCAB=226,WLCAB=100
TAUAB=.005,AMOAB=0
DMPAB=.02,CD2AB=.2
ANKAB=0,DL AB=0,H  AB=0
ANTEJ1=.354,ANEEJ1=.354,AK EJ1=0
P2 EJ1=14.7,T2 EJ1=520
W1 EJ1=16.42,T1 EJ1=560
ANTEJ2=.354,ANEEJ2=.354,AK EJ2=0
P2 EJ2=14.7,T2 EJ2=520
W1 EJ2=16.42,T1 EJ2=560
C2 MA T=300
SPOOL=0
RDLAB=0
```

```
YAWAB=0
X  AB=0,V  AB=0
P  AB=0,R  AB=0
ROLTL=0
YAWTL=0
V  VA=0
P  VA=0,R  VA=0,ROLVA=0
UW VA=0,VW VA=0,WW VA=0
INITIAL CONDITIONS
PTRAB=15.7,VTRAB=12.5
PTLAB=15.7,VTLAB=12.5
P1 EJ1=29.7,P1 EJ2=29.7
Q  TL=0
PITTL=1,U  TL=220.9,W  TL=9.86
ALTTL=4.
PRINT CONTROL=3
PRINTER PLOTS
ERROR CONTROLS
PTRAB=.01,VTRAB=.01
PTLAB=.01,VTLAB=.01
P1 EJ1=.01,P1 EJ2=.01
W  TL=.01,Q  TL=.01
PITTL=.01,ALTTL=.01,U  TL=.01
LINEAR ANALYSIS
NO STATES
INT CONTROL, PTRAB=1,VTRAB=1
STEADY STATE
XIC-X
ALL STATES
INT CONTROL,P1 EJ1=0,P1 EJ2=0,PTLAB=0,VTLAB=0
DISPLAY1
PITTL,VS,TIME
ALTTL,VS,TIME
W  TL,VS,TIME
Q  TL,VS,TIME
VTOTAL,VS,TIME
DISPLAY2
AACCEL,VS,TIME
LACCEL,VS,TIME
PTRAB,VS,TIME
VTRAB,VS,TIME
AL VA,VS,TIME
DISPLAY3
W3 EJ1,VS,TIME
RELIEFR,VS,TIME
PTRAB,VS,W3 EJ1
R11,VS,TIME
FZ2OL,VS,TIME
DISPLAY4
FX2OL,VS,TIME
GAPCR,VS,TIME
GAPWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
DISPLAY5
GAPCG,VS,TIME
ZFORCE,VS,TIME
ZFORCE,VS,STROKE
```

```
STROKE,VS,TIME
WRELR,VS,TIME
DISPLAY6
FXTAB,VS,TIME
FZTAB,VS,TIME
XACCEL,VS,TIME
U  TL,VS,TIME
T3 EJ1,VS,TIME
TINC=.02,TMAX=1,PRATE=1,INT MODE=5
TITLE=B-ARPV W/ABSS, LANDING SIMULATION WITH 3 DOF, MAX. PITCH LDG.
PLOT ID=S.J.BAUMGARTNER, MS 41-47, 655-5260
SIMULATE
```

```
TITLE=  FILE BDACN2
PARAMETER VALUES
P1 IO=14.7,T1 IO=520,SH1IO=0,CO1IO=0
MA1OL=49.69,C  OL=3.608,XP1OL=0,1SWOL=3,STAOL=0
IYYTL=790
XO OL=-.056 ,XA OL= -1.89,XU OL= 0,XDEOL= 0
ZA OL=-3.15,ZADOL= 0,ZQ OL=-2.91,ZU OL=0,ZDEOL=-1.272,
ZO OL= -.765,ZDSOL= -1.0
MO OL= .0206,MALOL= -.15,MADOL=0,MQ OL= -15.66,
MU OL=0,MDEOL= -1.805,MDSOL=2.991
ID1VA=3,IDGVA=6,S  VA=26,VS VA=221.2444,ALSVA=0.
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=0
PW VA=0,QW1VA=0,RW1VA=0
TABLE,TPOIO,2
0,1
0,10000
TABLE,A2TTB,2
0,50
0,0
TABLE,A2TTA,2
0,50
1.6,1.6
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE, ABLTK, 2
13,0,40.84,1
TABLE, XYZTK, 22
124.85,.765,0,67.5
123.765,1.85,0,22.5
115.25,2,0,0
99.75,2,0,0
84.3,2,0,0
68.9,2,0,0
53.5,2,0,0
38.1,2,0,0
22.7,2,0,0
14.235,1.85,0,-22.5
13.15,.765,0,-67.5
TABLE, DSMTK, 17
9.23,1,.2
9.23,1,.2
15.5,1,.2
15.5,1,.2
15.4,1,.7
15.4,1,.7
15.4,1,.7
15.4,1,.7
15.4,1,.7
9.23,1,.7
9.23,1,.7
TABLE, IALTK, 22
```

```
1,.0125,13,15
1,.0125,13,15
1,.0125,13,15
1,.0125,13,15
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
TABLE, RELTK, 4
0,1.2,3.2,100
0,0,144,144
TABLE,FTAFU2,4
0,15.9,17.9,1000
0,0,144,144
TABLE,XYZB,9
95.5,-21.3,14.0
95.5,21.3,14
-50,-48.3,13.5
-50,48.3,13.5
94.4,0,13.5
-92,0,12
TABLE,GAP,3
1,2,3
0,0,0
TABLE,TABEJ,13,3
2.02,3.38,5.76
0,1.0,1.02,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,10
26.3,3.63,3.136,1.915,1.01,1,1,1,1,1,1,1,1
9.9,2.94,2.77,2.526,2.42,2.334,1.816,1.01,1,1,1,1,1
3.8,2.53,2.5,2.46,2.43,2.4,2.29,2.11,1.98,1.89,1.38,1.01,1
PARAMETER VALUES
V  VA=0
P  VA=0,R  VA=0,ROLVA=0
UW VA=0,VW VA=0,WW VA=0
ANTEJ=.354,ANEEJ=.354,AK EJ=0
P2 EJ=14.7,T2 EJ=520
W1 EJ=21.84,T1 EJ=935
XTROL=-.0276,MALOL=.50
   MTROL=-.0147
PARAMETER VALUES
ANRTK=0,DL TK=0,H  TK=0
FINMA E=0,FINMA T=0
REARMU=.7,FRONTMU=.2,RVCRP=1.2,RVSATP=3.2,RVAREA=144.,KOUNT=1
AMASS=49.7,TSWITCH=1.
AN FU2=1
PA TK=14.7
NE TK=-11
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=295,WLTTK=85.5
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=226,WLCTK=100,TAUTK=.005
AMOTK=0,DMPTK=.02,EPCTK=1,VU TK=6
C2 MA T=300.
SPOOL=0
YAWTL=0
```

```
ROLTK=0
YAWTK=0
X  TK=0
V  TK=0
P  TK=0
R  TK=0
ROLTL=0
INITIAL CONDITIONS
PT TK=16.1,VT TK=32.174
PC TK=14.7,VC TK=15.403
P1 EJ=39.7
W  TL=21.4
Q  TL=0
U  TL=220.
PITTL=4
ALTTL=4.
PRINT CONTROL=4
PRINTER PLOTS
ERROR CONTROLS
PT TK=.01,VT TK=.01
PC TK=.01,VC TK=.01
P1 EJ=.01
W  TL=.01
Q  TL=.01
PITTL=.01
ALTTL=.01
U  TL=.01
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TK=1,VT TK=1,PC TK=1,VC TK=1
STEADY STATE
XIC-X
INT CONTROL, PT TK=0
SS PARAMETER=PT TK,IC
SS START=15.
SS STOP=18.
SS POINTS=7
DISPLAY1
W3 EJ,VS,PT TK
WTRO,VS,PT TK
WTCTK,VS,PT TK
WREL,VS,PT TK
T3 EJ,VS,PT TK
ALL STATES
INT CONTROL, P1 EJ=0
PRINT CONTROL=4
DISPLAY1
PITTL,VS,TIME
ALTTL,VS,TIME
W  TL,VS,TIME
TY4S3,VS,TIME
Q  TL,VS,TIME
DISPLAY2
U  TL,VS,TIME
LACCEL,VS,TIME
VTOTAL,VS,TIME
PT TK,VS,TIME
VT TK,VS,TIME
```

```
DISPLAY3
PC TK,VS,TIME
VC TK,VS,TIME
W3 EJ,VS,TIME
WTRO,VS,TIME
ZFORCE,VS,STROKE
DISPLAY4
FZ2OL,VS,TIME
WREL,VS,TIME
RELIEFA,VS,TIME
PRATIO,VS,TIME
R1O,VS,TIME
DISPLAY5
W2 IO,VS,TIME
STROKE,VS,TIME
GAPCL,VS,TIME
GAPWL,VS,TIME
GAPFF,VS,TIME
DISPLAY6
GAPFR,VS,TIME
GAPCG,VS,TIME
W3 EJ,VS,PT TK
T3 EJ,VS,TIME
WTCTK,VS,PT TK
TINC=.02,TMAX=1,PRATE=1,INT MODE=5
TITLE=B-ARPV W/ACRS, 3 DOF LANDING SIMULATION, MAX. PITCH LDG.
PLOT ID=S.J.BAUMGARTNER, MS 41-47, 655-5260
SIMULATE
```

```
TITLE=  FILE BDACN3
PARAMETER VALUES
MA1OL=49.69,C  OL=3.608,XP1OL=0,ISWOL=3,STAOL=0
IYYTL=790
XO OL=-.056 ,XA OL= -1.89,XU OL= 0,XDEOL= 0
ZA OL=-3.15,ZADOL= 0,ZQ OL=-2.91,ZU OL=0,ZDEOL=-1.272,
ZO OL= -.765,ZDSOL= -1.0
MO OL= .0206,MALOL= -.15,MADOL=0,MQ OL= -15.66,
MU OL=0,MDEOL= -1.805,MDSOL=2.991
ID1VA=3,IDGVA=6,S  VA=26,VS VA=221.2444,ALSVA=0.
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=0
PW VA=0,QW1VA=0,RW1VA=0
TABLE,A2TTB,2
0,50
0,0
TABLE,A2TTA,2
0,50
1.6,1.6
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE, ABLTK, 2
13,0,40.84,1
TABLE, XYZTK, 22
124.85,.765,0,67.5
123.765,1.85,0,22.5
115.25,2,0,0
99.75,2,0,0
84.3,2,0,0
68.9,2,0,0
53.5,2,0,0
38.1,2,0,0
22.7,2,0,0
14.235,1.85,0,-22.5
13.15,.765,0,-67.5
TABLE, DSMTK, 17
9.23,1,.2
9.23,1,.2
15.5,1,.2
15.5,1,.2
15.4,1,.7
15.4,1,.7
15.4,1,.7
15.4,1,.7
15.4,1,.7
9.23,1,.7
9.23,1,.7
TABLE, IALTK, 22
1,.0125,13,15
1,.0125,13,15
1,.0125,13,15
1,.0125,13,15
```

```
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
TABLE, RELTK, 4
0,.9,2.9,100
0,0,144,144
TABLE,FTAFU2,4
0,15.6,17.6,1000
0,0,144,144
TABLE,XYZB,9
95.5,-21.3,14.0
95.5,21.3,14
-5[illegible]-48.3,13.5
-50,48.3,13.5
94.4,0,13.5
-92,0,12
TABLE,GAP,3
1,2,3
0,0,0
TABLE,TABEJ,13,3
2.02,3.38,5.76
0,1.0,1.02,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.26,10
28.3,3.63,3.136,1.915,1.01,1,1,1,1,1,1,1,1
9.9,2.94,2.77,2.526,2.42,2.334,1.816,1.01,1,1,1,1,1
3.8,2.53,2.5,2.46,2.43,2.4,2.29,2.11,1.98,1.89,1.38,1.01,1
PARAMETER VALUES
V  VA=0
P  VA=0,R  VA=0,ROLVA=0
UW VA=0,VW VA=0,WW VA=0
ANTEJ=.354,ANEEJ=.354,AK EJ=0
P2 EJ=14.7,T2 EJ=520
W1 EJ=21.84,T1 EJ=935,WCUTK=0,TCUTK=520
XTROL=-.0276,MALOL=.50
   MTROL=-.0147
PARAMETER VALUES
ANRTK=0,DL TK=0,M  TK=0
FINMA E=0,FINMA T=0
REARMU=.7,FRONTMU=.2,RVCRP=.9,RVSATP=2.9,RVAREA=144.,KOUNT=1
AMASS=49.7,TSWITCH=1.
AN FU2=1
PA TK=14.7
NE TK=-11
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=279,WLTTK=85.5
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=226,WLCTK=100,TAUTK=.005
AMOTK=0,DMPTK=.02,EPCTK=1,VU TK=6
C2 MA T=300.
SPOOL=0
YAWTL=0
ROLTK=0
YAWTK=0
X  TK=0
V  TK=0
```

```
P  TK=0
R  TK=0
ROLTL=0
INITIAL CONDITIONS
PT TK=16.1,VT TK=32.174
PC TK=14.7,VC TK=15.403
P1 EJ=39.7
W  TL=21.4
Q  TL=0
U  TL=220.
PITTL=4
ALTTL=4.
PRINT CONTROL=4
PRINTER PLOTS
ERROR CONTROLS
PT TK=.01,VT TK=.01
PC TK=.01,VC TK=.01
P1 EJ=.01
W  TL=.01
Q  TL=.01
PITTL=.01
ALTTL=.01
U  TL=.01
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TK=1,VT TK=1,PC TK=1,VC TK=1
STEADY STATE
XIC-X
INT CONTROL, PT TK=0
SS PARAMETER=PT TK,IC
SS START=15.
SS STOP=18.
SS POINTS=7
DISPLAY1
W3 EJ,VS,PT TK
WTRQ,VS,PT TK
WTCTK,VS,PT TK
WREL,VS,PT TK
T3 EJ,VS,PT TK
ALL STATES
INT CONTROL, P1 EJ=0
PRINT CONTROL=4
DISPLAY1
PITTL,VS,TIME
ALTTL,VS,TIME
W  TL,VS,TIME
TY453,VS,TIME
Q  TL,VS,TIME
DISPLAY2
U  TL,VS,TIME
LACCEL,VS,TIME
VTOTAL,VS,TIME
PT TK,VS,TIME
VT TK,VS,TIME
DISPLAY3
PC TK,VS,TIME
VC TK,VS,TIME
W3 EJ,VS,TIME
```

```
WTRO,VS,TIME
ZFORCE,VS,STROKE
DISPLAY4
FZ2OL,VS,TIME
WREL,VS,TIME
RELIEFA,VS,TIME
PRATIO,VS,TIME
RIO,VS,TIME
DISPLAY5
STROKE,VS,TIME
GAPCL,VS,TIME
GAPWL,VS,TIME
GAPFF,VS,TIME
DISPLAY6
GAPFR,VS,TIME
GAPCG,VS,TIME
W3 EJ,VS,PT TK
T3 EJ,VS,TIME
WTCTK,VS,PT TK
TINC=.02,TMAX=2.5,PRATE=1,INT MODE=5
TITLE=B-ARPV W/ACRS, 3 DOF LANDING SIMULATION, MAX. PITCH LDG.
PLOT ID=S.J.BAUMGARTNER, MS 41-47, 655-5260
SIMULATE
```

```
MODEL DESCRIPTION      BOEING ABSS 3 DOF LANDING, FILE BDMBN2
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,VTOTAL,RELIEFR,RELIEFL,AACCEL,LACCEL,
   GAPCL,GAPCR,GAPWL,GAPWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH,
   ZFORCE,STROKE,WRELR,WRELL,XACCEL
ADD TABLES=XYZB,21,GAP,9
LOCATION=56     VA          INPUTS=TL
LOCATION = 80     TA
LOCATION = 66     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 68     MA T     INPUTS=TA(D2=C1)
LOCATION = 63     TB
FORTRAN STATEMENTS
       RPD=.01745324
       CALVA=COS(AL VA*RPD)
       SALVA=SIN(AL VA*RPD)
       IF (FO MA E .GT. 15.) FO MA E = 15.
       IF (FO MA E .LT. -40.) FO MA E = -40.
       IF (FO MA T .LT. 300.) FO MA T = 300.
       IF (FO MA T .GT. 970.) FO MA T = 970.
       IF (TSWITCH .LT. 0.1) FO MA T = 0.
       ELEOL = FO MA E
       TH TG = FO MA T
       STAOL = A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
       IF (KOUNT .EQ. 1) WRITE(6,10) (RELAB(I),I=4,11),(DSMAB(I),I=4,27),
      1   (FTAFU2(I),I=4,11),(FTAFU3(I),I=4,11)
   10 FORMAT(8E13.5)
       RELAB(5)=RVCRP
       RELAB(6)=RVSATP
       RELAB(10)=RELAB(11)=R
EA
       DSMAB(6)=DSMAB(9)=FRONTMU
       DSMAB(12)=DSMAB(15)=DSMAB(18)=DSMAB(21)=DSMAB(24)=DSMAB(27)=REARMU
       FTAFU2(5)=14.7+RVCRP
       FTAFU2(6)=14.7+RVSATP
       FTAFU2(10)=FTAFU2(11)=RVAREA
       FTAFU3(5)=14.7+RVCRP
       FTAFU3(6)=14.7+RVSATP
       FTAFU3(10)=FTAFU3(11)=RVAREA
       VTLAB=VTRAB
       PTLAB=PTRAB
LOCATION=45     EJ1     INPUTS=AB(PTR=P,3)
LOCATION=43     EJ2     INPUTS=AB(PTL=P,3)
LOCATION=24    AB    INPUTS=TL
INPUTS=EJ1(W,3=WTR,T,3=TTR)
INPUTS=EJ2(W,3=WTL,T,3=TTL)
LOCATION = 36     FU2     INPUTS=AB(PTR=FIN)
LOCATION=38      FU3     INPUTS=AB(PTL=FIN)
FORTRAN STATEMENTS
       RELIEFR = FO FU2
       RELIEFL=FO FU3
       CALL FNFLOW (PTRAB,PA AB,T3 EJ1,CDAAB*RELIEFR,1.,FN,WRELR)
       CALL FNFLOW (PTLAB,PA AB,T3 EJ2,CDAAB*RELIEFL,1.,FN,WRELL)
       FX1S3=0
       FY1S3=0
       FZ1S3=0
```

```
      TX1S3=0
      TY1S3=0
      TZ1S3=0
      FY3S3=0
      TX3S3=0
      TZ3S3=0
LOCATION=16    S3
INPUTS=AB(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=OL(2=3)
FORTRAN STATEMENTS
      UD TL=FX4S3/AMASS-(Q  TL*W  TL)*.01745-
     1       32.2*SIN(PITTL*.01745)
      WD TL=FZ4S3/AMASS-(-Q  TL*U  TL)*.01745+
     1       32.2*COS(PITTL*.01745)*COS(ROLTL*.01745)
LOCATION=10    TL    INPUTS=S3(TY,4=TY)
FORTRAN STATEMENTS
      ZFORCE=-WD TL/32.2
      STROKE=2.145-ALTTL
      KENERGY=.5*AMASS*(U  TL*U  TL+W  TL*W  TL)
     1  +.5*(IYYTL*Q  TL*Q  TL)
      PENERGY= (PTRAB-PA AB)*VTRAB*144. + (PTLAB-PA AB)*VTLAB*144.
     1    + AMASS*32.2*ALTTL
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(QD TL*QD TL)
      LACCEL= (SQRT(UD TL*UD TL+WD TL*WD TL))/32.2
      XACCEL=EU VA*COS(PITTL)+EW VA*SIN(PITTL)
      VTOTAL=SQRT(U  TL*U  TL+W  TL*W  TL)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTTL*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=0
      PITTR=PITTL
      YAWTR=0
LOCATION = 63    TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTTL*12.+W2 TR
      GAPCL=GAP(4)
      GAPCR=GAP(5)
      GAPWL=GAP(6)
      GAPWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTTL*12. -14.5
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION      BOEING CUSHION LANDING, FILE BDMCN2
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPCL,GAPCR,GAPWL,GAPWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH,WREL,WTRO,
   ZFORCE,STROKE,XACCEL
ADD TABLES=XYZB,21,GAP,9
LOCATION=56     VA          INPUTS=TL
LOCATION = 80     TA
LOCATION = 66     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 68     MA T     INPUTS=TA(D2=C1)
LOCATION = 63     TB
FORTRAN STATEMENTS
      IF (FO MA E .GT. 15.) FO MA E = 15.
      IF (FO MA E .LT. -40.) FO MA E = -40.
      IF (FO MA T .LT. 300.) FO MA T = 300.
      IF (FO MA T .GT. 970.) FO MA T = 970.
      IF (TSWITCH .LT. 0.1) FO MA T = 0.
      ELEOL = FO MA E
      TH TG = FO MA T
      STAOL = A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (KOUNT .EQ. 1) WRITE(6,10) (RELTK(I),I=4,11),(DSMTK(I),I=4,36),
     1     (FTAFU2(I),I=4,11)
   10 FORMAT(8E13.5)
      RELTK(5)=RVCRP
      RELTK(6)=RVSATP
      RELTK(10)=RELTK(11)=RVAREA
      DSMTK(6)=DSMTK(9)=DSMTK(12)=DSMTK(15)=FRONTMU
      DSMTK(18)=DSMTK(21)=DSMTK(24)=DSMTK(27)=REARMU
      DSMTK(30)=DSMTK(33)=DSMTK(36)=REARMU
      FTAFU2(5)=14.7+RVCRP
      FTAFU2(6)=14.7+RVSATP
      FTAFU2(10)=FTAFU2(11)=RVAREA
      P2 IO = PC TK
LOCATION=43     EJ     INPUTS=TK(PT=P,3)
LOCATION=45     IO
FORTRAN STATEMENTS
      WTRTK=W3 EJ * 2.
LOCATION=24    TK    INPUTS=TL,EJ(T,3=TTR),IO(W,2=WCU,T,2=TCU)
LOCATION = 35     FU2     INPUTS=TK(PT=FIN)
FORTRAN STATEMENTS
      RELIEFA = FO FU2
      CALL FNFLOW(PT TK,PA TK,T3 EJ,CDATK*RELIEFA,1.,FN,WREL)
      WTRO=WTATK+WTCTK
      PRATIO=(PC TK-PA TK)/(PT TK-PA TK)
      FX1S3 = 0
      FY1S3 = 0
      FZ1S3 = 0
      TX1S3 = 0
      TY1S3 = 0
      TZ1S3 = 0
      FY3S3=0
      TX3S3=0
      TZ3S3=0
LOCATION=16    S3
INPUTS=TK(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
```

```
INPUTS=OL(2=3)
FORTRAN STATEMENTS
      UD TL=FX4S3/AMASS-(Q  TL*W  TL)*.01745-
     1       32.2*SIN(PITTL*.01745)
      WD TL=FZ4S3/AMASS-(-Q
     1       32.2*COS(PITTL*.01745)*COS(ROLTL*.01745)
      ZFORCE = -WD TL/32.2
      STROKE = 2.4417 - ALTTL
LOCATION=10   TL   INPUTS=S3(TY,4=TY)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  TL*U  TL+W  TL*W  TL)
     1  +.5*(IYYTL*Q  TL*Q  TL)
      PENERGY= (PT TK-PA TK)*VT TK*144. + (PC TK-PA TK)*VC TK*144.
     1   + AMASS*32.2*ALTTL
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(QD TL*QD TL)
      LACCEL= (SQRT(UD TL*UD TL+WD TL*WD TL))/32.2
      VTOTAL=SQRT(U  TL*U  TL+W  TL*W  TL)
      XACCEL=EU VA*COS(PITTL) + EW VA*SIN(PITTL)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTTL*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=0
      PITTR=PITTL
      YAWTR=0
LOCATION = 63    TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTTL*12.+W2 TR
      GAPCL=GAP(4)
      GAPCR=GAP(5)
      GAPWL=GAP(6)
      GAPWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTTL*12. -14.5
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION     BOEING CUSHION LANDING, FILE BDMCN3
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPCL,GAPCR,GAPWL,GAPWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH,WREL,WTRO,
   IFORCE,STROKE,XACCEL
ADD TABLES=XYZB,21,GAP,9
LOCATION=56     VA          INPUTS=TL
LOCATION = 80     TA
LOCATION = 66     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 68     MA T     INPUTS=TA(D2=C1)
LOCATION = 63     TB
FORTRAN STATEMENTS
      IF (FO MA E .GT. 15.) FO MA E = 15.
      IF (FO MA E .LT. -40.) FO MA E = -40.
      IF (FO MA T .LT. 300.) FO MA T = 300.
      IF (FO MA T .GT. 970.) FO MA T = 970.
      IF (TSWITCH .LT. 0.1) FO MA T = 0.
      ELEOL = FO MA E
      TH TG = FO MA T
      STAOL = A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (KOUNT .EQ. 1) WRITE(6,10) (RELTK(I),I=4,11),(DSMTK(I),I=4,36),
     1     (FTAFU2(I),I=4,11)
   10 FORMAT(8E13.5)
      RELTK(5)=RVCRP
      RELTK(6)=RVSATP
      RELTK(10)=RELTK(11)=RVAREA
      DSMTK(6)=DSMTK(9)=DSMTK(12)=DSMTK(15)=FRONTMU
      DSMTK(18)=DSMTK(21)=DSMTK(24)=DSMTK(27)=REARMU
      DSMTK(30)=DSMTK(33)=DSMTK(36)=REARMU
      FTAFU2(5)=14.7+RVCRP
      FTAFU2(6)=14.7+RVSATP
      FTAFU2(10)=FTAFU2(11)=RVAREA
LOCATION=43     EJ     INPUTS=TK(PT=P,3)
FORTRAN STATEMENTS
      WTRTK=W3 EJ
LOCATION=24    TK    INPUTS=TL,EJ(T,3=TTR)
LOCATION = 35     FU2     INPUTS=TK(PT=FIN)
FORTRAN STATEMENTS
      RELIEFA = FO FU2
      CALL FNFLOW(PT TK,PA TK,T3 EJ,CDATK*RELIEFA,1.,FN,WREL)
      WTRO=WTATK+WTCTK
      PRATIO=(PC TK-PA TK)/(PT TK-PA TK)
      FX1S3 = 0
      FY1S3 = 0
      FZ1S3 = 0
      TX1S3 = 0
      TY1S3 = 0
      TZ1S3 = 0
      FY3S3=0
      TX3S3=0
      TZ3S3=0
LOCATION=16    S3
INPUTS=TK(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=OL(2=3)
FORTRAN STATEMENTS
```

```
      UD TL=FX4S3/AMASS-(Q  TL*W  TL)*.01745-
     1       32.2*SIN(PITTL*.01745)
      WD TL=FZ4S3/AMASS-(-Q  TL*U  TL)*.01745+
     1       32.2*COS(PITTL*.01745)*COS(ROLTL*.01745)
      ZFORCE = -WD TL/32.2
      STROKE = 2.4417 - ALTTL
LOCATION=10    TL    INPUTS=S3(TY,4=TY)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  TL*U  TL+W  TL*W  TL)
     1  +.5*(IYYTL*Q  TL*Q  TL)
      PENERGY= (PT TK-PA TK)*VT TK*144. + (PC TK-PA TK)*VC TK*144.
     1    + AMASS*32.2*ALTTL
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(QD TL*QD TL)
      LACCEL= (SQRT(UD TL*UD TL+WD TL*WD TL))/32.2
      VTOTAL=SQRT(U  TL*U  TL+W  TL*W  TL)
      XACCEL=EU VA*COS(PITTL) + EW VA*SIN(PITTL)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTTL*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=0
      PITTR=PITTL
      YAWTR=0
LOCATION = 63     TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTTL*12.+W2 TR
      GAPCL=GAP(4)
      GAPCR=GAP(5)
      GAPWL=GAP(6)
      GAPWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTTL*12. -14.5
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION      BOEING CUSHION LANDING, F
 BOMCN4
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPCL,GAPCR,GAPWL,GAPWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH,WREL,WTRO,
   ZFORCE,STROKE,XACCEL
ADD TABLES=XYZB,21,GAP,9
LOCATION=56     VA          INPUTS=TL
LOCATION = 80     TA
LOCATION = 66     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 68     MA T     INPUTS=TA(D2=C1)
LOCATION = 63     TB
FORTRAN STATEMENTS
       IF (FO MA E .GT. 15.) FO MA E = 15.
       IF (FO MA E .LT. -40.) FO MA E = -40.
       IF (FO MA T .LT. 300.) FO MA T = 300.
       IF (FO MA T .GT. 970.) FO MA T = 970.
       IF (TSWITCH .LT. 0.1) FO MA T = 0.
       ELEOL = FO MA E
       TH TG = FO MA T
       STAOL = A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
       IF (KOUNT .EQ. 1) WRITE(6,10) (RELTK(I),I=4,11),(DSMTK(I),I=4,36),
     1     (FTAFU2(I),I=4,11)
   10 FORMAT(8E13.5)
       RELTK(5)=RVCRP
       RELTK(6)=RVSATP
       RELTK(10)=RELTK(11)=RVAREA
       DSMTK(6)=DSMTK(9)=DSMTK(12)=DSMTK(15)=FRONTMU
       DSMTK(18)=DSMTK(21)=DSMTK(24)=DSMTK(27)=REARMU
       DSMTK(30)=DSMTK(33)=DSMTK(36)=REARMU
       FTAFU2(5)=14.7+RVCRP
       FTAFU2(6)=14.7+RVSATP
       FTAFU2(10)=FTAFU2(11)=RVAREA
       P2 IO = PC TK
LOCATION=43     EJ     INPUTS=TK(PT=P,3)
LOCATION=45     IO
FORTRAN STATEMENTS
       WTRTK=W3 EJ * 2.
       IF (ALTTL .LT. 3.5) WTRTK=W3 EJ
LOCATION=24    TK    INPUTS=TL,EJ(T,3=TTR),IO(W,2=WCU,T,2=TCU)
LOCATION = 35     FU2     INPUTS=TK(PT=FIN)
FORTRAN STATEMENTS
       RELIEFA = FO FU2
       CALL FNFLOW(PT TK,PA TK,T3 EJ,CDATK*RELIEFA,1.,FN,WREL)
       WTRO=WTATK+WTCTK
       PRATIO=(PC TK-PA TK)/(PT TK-PA TK)
       FX1S3 = 0
       FY1S3 = 0
       FZ1S3 = 0
       TX1S3 = 0
       TY1S3 = 0
       TZ1S3 = 0
       FY3S3=0
       TX3S3=0
       TZ3S3=0
```

```
LOCATION=16    S3
INPUTS=TK(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=OL(2=3)
FORTRAN STATEMENTS
       UD TL=FX4S3/AMASS-(Q  TL*W  TL)*.01745-
     1       32.2*SIN(PITTL*.01745)
       WD TL=FZ4S3/AMASS-(-Q  TL*U  TL)*.01745+
     1       32.2*COS(PITTL*.01745)*COS(ROLTL*.01745)
       ZFORCE = -WD TL/32.2
       STROKE = 2.4417 - ALTTL
LOCATION=10    TL    INPUTS=S3(TY,4=TY)
FORTRAN STATEMENTS
       KENERGY=.5*AMASS*(U  TL*U  TL+W  TL*W  TL)
     1  +.5*(IYYTL*Q  TL*Q  TL)
       PENERGY= (PT TK-PA TK)*VT TK*144. + (PC TK-PA TK)*VC TK*144.
     1    + AMASS*32.2*ALTTL
       TENERGY= KENERGY+PENERGY
       KOUNT=KOUNT+1
       AACCEL=SQRT(QD TL*QD TL)
       LACCEL= (SQRT(UD TL*UD TL+WD TL*WD TL))/32.2
       VTOTAL=SQRT(U  TL*U  TL+W  TL*W  TL)
       XACCEL=EU VA*COS(PITTL) + EW VA*SIN(PITTL)
       CNT=0.
    20 CNT=CNT+1.
       I=CNT+.001
       IF (I .GT.1) GAP(I+2) = ALTTL*12. +W2 TR
       U1 TR=XYZB(3*I+1)
       V1 TR=XYZB(3*I+2)
       W1 TR=XYZB(3*I+3)
       ROLTR=0
       PITTR=PITTL
       YAWTR=0
LOCATION = 63     TR
FORTRAN STATEMENTS
       IF (CNT .LT. 6.) GO TO 20
       GAP(9)=ALTTL*12.+W2 TR
       GAPCL=GAP(4)
       GAPCR=GAP(5)
       GAPWL=GAP(6)
       GAPWR=GAP(7)
       GAPFF =GAP(8)
       GAPFR =GAP(9)
       GAPCG =ALTTL*12. -14.5
END OF MODEL
PRINT
```

```
PR  T   TITLE=            FILE BFABD20
LI      PARAMETER VALUES
DE      MA1DL=49.69,C  OL=3.608,XP1DL=0,ISWDL=3,STADL=0
LI  A   IXXSG=67,IYYSG=790,IZZSG=570,IXZSG=20,IXYSG=0,IYZSG=0
IN      XO OL=-.056 ,XA OL= -1.89,XU OL= 0,XDEDL= 0
ST      ZA OL=-3.15,ZADOL= 0,ZQ OL=-2.91,ZU OL=0,ZDEDL=-1.272,
XI  X   ZO OL= -.765,ZDSDL= -1.0
IN      MO OL= .0206,MALOL= -.15,MADOL=0,MQ OL= -15.66,
O.      MU OL=0,MDEDL= -1.805,MDSDL=2.991
YO  C   B  DL=8.0833,FSPDL=0,SPODL=0
ST      FY1DL=0,FZ1DL=0,TX1DL=0,TY1DL=0,TZ1DL=0
IN      YB DL=-1.158,YBDDL=0,YP DL=.119,YR DL=1.44,YDRDL=.2137,YDADL=0
O.      LDRDL=.064,LB DL=-.1662,LBDDL=0,LP DL=-.235,LR DL=0.49,LDADL=0.1203
YO      NDRDL=-.257,NDADL=-.0722,NB DL=.0516,NBDDL=0,NP DL=.258,NR DL=-1.543
SS      LBRDL=1,YBRDL=1,NBRDL=1
SS  T   ID1VA=3,IDGVA=6,S  VA=26,VS VA=221.2444,ALSVA=0.
SS      C1 MA1= -1.,C1 MA2=1,C2 MA2=0
SS      PW VA=0,QW1VA=0,RW1VA=0,VW VA=0
DI  L   C1 MA3=-1,AN FU=1
03      ELEVATR=1.
U       TABLE,FTAFU,4
W   G   0,930,50000,55000
FO      2000,2000,0,0
FO      TABLE,A2TTA2,2
DI  L   0,50
VT      0,0
AL      TABLE,B2TTA2,4
EL  L   0,5,5.5,50
FX      0,0,0,0
FZ      TABLE,C2TTA2,4
ST  D   0,5,5.5,50
AL      0,0,0,0
PL      TABLE,A2TTA,2
TI  E   0,50
PR      0,0
DI      TABLE,B2TTA,2
FO  A   0,50
FO      0,0
FO      TABLE,C2TTA,2
03  C   0,50
R2      0,0
DI      TABLE,D2TTA,2
U   G   0,50
V       1,1
W       INITIAL CONDITIONS
FO  A   U  SG=221.24,V  S
VT
DI      ,W  SG=9,P  SG=0,Q  SG=0,R  SG=0,
AL  A   ROLSG=0,PITSG=1,YAWSG=0,ALTSG=2000,X  SG=931,Y  SG=0
RO      PRINT CONTROL=4
PI      O.C. DATA
YA  G   YOP = 0,0,0,0,1,0,221.24,0,9,9,0,0
AL      UOP = 0,0,300,0
DI      Q = .0036,.01,.11,2,0,2,2,.06,1,1,4,4
P   G   RU = .01,.01,.02,.01
Q       PARAMETER VALUES
R       LTRDL=-.079,YTRDL=-.196,NTRDL=-.261,XTRDL=-.0156,MALOL=.25
BE  A      MTRDL=-.0079
```

```
PRINTER PLOTS
LINEAR ANALYSIS
DESIGN O.C.
LINEAR ANALYSIS
INT CONTROL, ALTSG=0,X  SG=0
STEADY STATE
XIC=X
INT CONTROL,ALTSG=1
O.C. DATA
YOP=C(9,1)0,0
STEADY STATE
INT CONTROL, ALTSG=0,PITSG=0
O.C. DATA
YOP=C(9,1)9,9
SS PARAMETER=PITSG,IC
SS START=2
SS STOP=6
SS POINTS=9
DISPLAY1
03 OC,VS,PITSG
U  SG,VS,PITSG
W  SG,VS,PITSG
FO MA1,VS,PITSG
FO MA2,VS,PITSG
DISPLAY2
VT VA,VS,PITSG
AL VA,VS,PITSG
ELEOL,VS,PITSG
FX2OL,VS,PITSG
FZ2OL,VS,PITSG
STEADY STATE
ALL STATES
PLOT ID = S.J.BAUMGARTNER, MS 41-47
TITLE=B-ARPV W/ACRS DEPLOYED, LANDING APPROACH ANALYSIS
PRATE=2
DISPLAY1
FO MA E,VS,TIME
FO MA R,VS,TIME
FO MA A,VS,TIME
03 OC,VS,TIME
R24,VS,TIME
DISPLAY2
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
FO MA1,VS,TIME
VT VA,VS,TIME
DISPLAY3
AL VA,VS,TIME
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
ALTSG,VS,TIME
DISPLAY4
P  SG,VS,TIME
Q  SG,VS,TIME
R  SG,VS,TIME
BE VA,VS,TIME
```

```
DISPLAY5
X   SG,VS,TIME
Y   SG,VS,TIME
YD  SG,VS,TIME
FO  FU,VS,TIME
FO  MA3,VS,TIME
TINC=.1
TMAX=20.
```

```
TITLE=              FILE BFATD11
PARAMETER VALUES
MA1DL=49.69,C   DL=3.608,XP1DL=0,ISWDL=3,STADL=0
IXXSG=67,IYYSG=790,IZZSG=570,IXZSG=20,IXYSG=0,IYZSG=0
XO DL=-.056 ,XA DL= -1.89,XU DL= 0,XDEDL= 0
ZA DL=-3.15,ZADDL= 0,ZQ DL=-2.91,ZU DL=0,ZDEDL=-1.272,
ZO DL= -.765,ZDSDL= -1.0
MO DL= .0206,MALDL= -.15,MADDL=0,MQ DL= -15.66,
MU DL=0,MDEDL= -1.805,MDSDL=2.991
B   DL=8.0833,FSPDL=0,SPODL=0
FY1DL=0,FZ1DL=0,TX1DL=0,TY1DL=0,TZ1DL=0
YB DL=-1.158,YBDDL=0,YP DL=.119,YR DL=1.44,YDRDL=.2137,YDADL=0
LDRDL=.064,LB DL=-.1662,LBDDL=0,LP DL=-.235,LR DL=0.49,LDADL=0.1203
NDRDL=-.257,NDADL=-.0722,NB DL=.0516,NBDDL=0,NP DL=.258,NR DL=-1.543
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=26,VS VA=221.2444,ALSVA=0.
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
TABLE,FTAFU,4
0,930,50000,55000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,-10.61,-10.61
TABLE,C2TTA2,4
0,5,5.5,50
0,0,10.61,10.61
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
INITIAL CONDITIONS
U  SG=221.24,V  SG=0,W  SG=9,P  SG=0,Q  SG=0,R  SG=0,
ROLSG=0,PITSG=1,YAWSG=0,ALTSG=2000,X  SG=931,Y  SG=0
PRINT CONTROL=3
O.C. DATA
YOP = 0,0,0,0,1,0,221.24,0,9,9,0,0
UOP = 0,0,300,0
Q = .0036,.01,.11,2,0,2,.04,.06,1.5,2,4,4
RU = .01,.01,.02,.01
PARAMETER VALUES
LTRDL=-.0748,YTRDL=-.332,NTRDL=-.364,XTRDL=-.0276,MALDL=.35
   MTRDL=-.0147
LINEAR ANALYSIS
DESIGN O.C.
LINEAR ANALYSIS
```

```
INT CONTROL, ALTSG=0,X  SG=0,Y  SG=0
STEADY STATE
XIC-X
ALL STATES
PRINTER PLOTS, PLOT ON
PLOT ID = S.J.BAUMGARTNER, MS 41-47
TITLE=B-ARPV W/ACRS DEPLOYED, LANDING APPROACH WITH SHARP EDGED GUST   T=5
PRATE=2
DISPLAY1
FO MA E,VS,TIME
FO MA R,VS,TIME
FO MA A,VS,TIME
O3 OC,VS,TIME
R24,VS,TIME
DISPLAY2
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
FO MA1,VS,TIME
VT VA,VS,TIME
DISPLAY3
AL VA,VS,TIME
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
ALTSG,VS,TIME
DISPLAY4
P  SG,VS,TIME
Q  SG,VS,TIME
R  SG,VS,TIME
BE VA,VS,TIME
DISPLAY5
X  SG,VS,TIME
Y  SG,VS,TIME
YD SG,VS,TIME
FO FU,VS,TIME
FO MA3,VS,TIME
TINC=.1
TMAX=20.
SIMULATE
```

```
TITLE=              FILE BFATD20
PARAMETER VALUES
MA1DL=49.69,C   DL=3.608,XP1DL=0,ISWDL=3,STADL=0
IXXSG=67,IYYSG=790,IZZSG=570,IXZSG=20,IXYSG=0,IYZSG=0
XO DL=-.056 ,XA DL= -1.89,XU DL= 0,XDEDL= 0
ZA DL=-3.15,ZADDL= 0,ZQ DL=-2.91,ZU DL=0,ZDEDL=-1.272,
ZO DL= -.765,ZDSDL= -1.0
MO DL= .0206,MALDL= -.15,MADDL=0,MQ DL= -15.66,
MU DL=0,MDEDL= -1.805,MDSDL=2.991
B   DL=8.0833,FSPDL=0,SPODL=0
FY1DL=0,FZ1DL=0,TX1DL=0,TY1DL=0,TZ1DL=0
YB DL=-1.158,YBDDL=0,YP DL=.119,YR DL=1.44,YDRDL=.2137,YDADL=0
LDRDL=.064,LB DL=-.1662,LBDDL=0,LP DL=-.235,LR DL=0.49,LDADL=0.1203
NDRDL=-.257,NDADL=-.0722,NB DL=.0516,NBDDL=0,NP
=.258,NR DL=-1.543
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S   VA=26,VS VA=221.2444,ALSVA=0.
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
PW VA=0,QW1VA=0,RW1VA=0,VW VA=0
C1 MA3=-1,AN FU=1
ELEVATR=1.
TABLE,FTAFU,4
0,930,50000,55000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
INITIAL CONDITIONS
U   SG=221.24,V   SG=0,W   SG=9,P   SG=0,Q   SG=0,R   SG=0,
RDLSG=0,PITSG=1,YAWSG=0,ALTSG=2000,X   SG=931,Y   SG=0
PRINT CONTROL=4
O.C. DATA
YOP = 0,0,0,0,1,0,221.24,0,9,9,0,0
UOP = 0,0,300,0
Q  = .0036,.01,.11,2,0,2,2,.06,1,1,4,4
RU = .01,.01,.02,.01
PARAMETER VALUES
LTRDL=-.0748,YTRDL=-.332,NTRDL=-.384,XTRDL=-.0276,MALDL=.50
   MTRDL=-.0147
PRINTER PLOTS
```

```
LINEAR ANALYSIS
DESIGN O.C.
LINEAR ANALYSIS
TABLE,B2TTA2,2
0.50
+0.40
INT CONTROL, ALTSG=0,X  SG=0
STEADY STATE
XIC-X
INT CONTROL,ALTSG=1
O.C. DATA
YOP=C(9,1)0.0
STEADY STATE
INT CONTROL, ALTSG=0,PITSG=0
O.C. DATA
YOP=C(9,1)9.9
TITLE=B-ARPV W/ACRS DEPLOYED, LANDING APPROACH TRIM ANALYSIS W/CROSSWIND
SS PARAMETER=PITSG,IC
SS START=2
SS STOP=5
SS POINTS=13
DISPLAY1
03 OC,VS,PITSG
U  SG,VS,PITSG
W  SG,VS,PITSG
FO MA1,VS,PITSG
FO MA2,VS,PITSG
DISPLAY2
VT VA,VS,PITSG
AL VA,VS,PITSG
ELEOL,VS,PITSG
FX2OL,VS,PITSG
FZ2OL,VS,PITSG
STEADY STATE
ALL STATES
PLOT ID = S.J.BAUMGARTNER, MS 41-47
TITLE=B-ARPV W/ACRS DEPLOYED, LANDING APPROACH ANALYSIS
PRATE=2
DISPLAY1
FO MA E,VS,TIME
FO MA R,VS,TIME
FO MA A,VS,TIME
03 OC,VS,TIME
R24,VS,TIME
DISPLAY2
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
FO MA1,VS,TIME
VT VA,VS,TIME
DISPLAY3
AL VA,VS,TIME
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
ALTSG,VS,TIME
DISPLAY4
P  SG,VS,TIME
```

```
Q   SG,VS,TIME
R   SG,VS,TIME
BE VA,VS,TIME
DISPLAY5
X   SG,VS,TIME
Y   SG,VS,TIME
YD SG,VS,TIME
FO FU,VS,TIME
FO MA3,VS,TIME
TINC=.1
TMAX=20.
```

```
MODEL DESCRIPTION    B-ARPV, LANDING APPROACH TRIM ANALYSIS,  BFMTD20
ADD PARAMETERS, ELEVATR,UW,VW,WW,RR,PP,YY,VW2
FORTRAN STATEMENTS
C
C         COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C         LANDING APPROACH
C
LOCATION = 16     TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       VW2=UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1   + VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2   + WW*(SIN(RR)*COS(PP))
       VW VA=VW2
LOCATION=46     VA          INPUTS=SG,TA2(A2=UW,C2=WW)
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
C
C         THE FOLLOWING FOUR LINES HAVE BEEN MODIFIED
C
       FINMA2 = SQRT(U  SG*U  SG+W  SG*W  SG)*SIN(FO MA1*3.14159/180.)
       RPD=.01745324
       CALVA = COS(AL VA*RPD)
       SALVA = SIN(AL VA*RPD)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C         COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C         GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C         ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59     FU     INPUTS=SG(X=FIN)
LOCATION = 67     MA3     INPUTS=SG(ALT=C2),FU(FO=FIN)
LOCATION=72     OC
O.C. INPUTS = P  SG,Q  SG,R  SG,ROLSG,PITSG,YAWSG,VT VA,V  SG,W  SG,
              FO MA2,Y  SG,FO MA3
O.C. OUTPUTS = FINMA A,FINMA E,FX10L,FINMA R
FORTRAN STATEMENTS
C
C         COMPONENTS MA E, MA A, AND  MA R  COMBINE O.C. OUTPUT
C         COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT COMMANDS.
C         TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF THE OPTIMAL
C         CONTROLLER.
C
LOCATION = 113     TA
LOCATION = 143     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 145     MA A    INPUTS=TA(B2=C2,D2=C1)
LOCATION = 147     MA R    INPUTS=TA(C2=C2,D2=C1)
FORTRAN STATEMENTS
       IF (FO MA E .GT. 15.) FO MA E=15.
       IF (FO MA E .LT. -40.) FO MA E = -40.
       IF (ELEVATR .GT. .1) ELEOL = FO MA E
       IF (03 OC .LT. 300.) 03 OC = 300.
```

```
      IF (03 OC .GT. 970.) 03 OC = 970.
      03 OC = 300.
LOCATION=2      OL          INPUTS=VA
FORTRAN STATEMENTS
      IF (FO MA R .GT. 15.) FO MA R = 15.
      IF (FO MA R .LT. -15.) FO MA R = -15.
      AILDL = FO MA A
      RUDDL = FO MA R
LOCATION=24     DL          INPUTS=VA,OL
LOCATION=10     SG          INPUTS=DL,OL
END OF MODEL
PRINT
```

```
TITLE=BOEING LANDING WITH SUCTION BRAKING, FILE BLAAS03
TABLE,TPOID,2
0,.1
0,20
TABLE,TABEJ1,7,5
1,12.24,12.93,13.61,15
1.01,1.055,1.06,1.07,1.08,1.085,1.15
1,1,1,1,1,1,1
19,10.27,9,6.05,3.1,1.47,1.2
20,10.39,9.73,6.51,4.18,2.85,1.3
21,10.5,9.83,6.9,5.17,4.15,1.4
22,10.6,9.9,7,5.3,4.3,1.5
TABLE,TABEJ2,7,5
1,12.24,12.93,13.61,15
1.01,1.055,1.06,1.07,1.08,1.085,1.15
1,1,1,1,1,1,1
19,10.27,9,6.05,3.1,1.47,1.2
20,10.39,9.73,6.51,4.18,2.85,1.3
21,10.5,9.83,6.9,5.17,4.15,1.4
22,10.6,9.9,7,5.3,4.3,1.5
TABLE,ABLTK,2
13,0,40.84,1
TABLE,XYZTK,22
106.85,.765,0,67.5
105.765,1.85,0,22.5
98.75,2,0,0
86.25,2,0,0
73.5,2,0,0
60.5,2,0,0
47.5,2,0,0
34.5,2,0,0
21.5,2,0,0
14.235,1.85,0,-22.5
13.15,.765,0,-67.5
TABLE,DSMTK,17
9.23,1,.7
9.23,1,.7
12.5,1,.7
12.5,1,.7
13,1,.7
13,1,.7
13,1,.7
13,1,.7
13,1,.7
9.23,1,.7
9.23,1,.7
TABLE,IALTK,22
1,.0111,17.42,6
1,.0111,17.42,6
1,.00872,17.42,6
1,.00872,17.42,6
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
```

```
TABLE,RELTK,4
0,1.62,2.7,100
0,0,144,144
PARAMETER VALUES
P2 DV3=14.7
P1 IO=200,T1 IO=660,SH1IO=0,CO1IO=0
AK2FS=3,D2 FS=1.16
AK3FS=3,D3 FS=1.63
DHYFS=2,AHTFS=.1044,TAMFS=520
HO FS=1,VOLFS=.00364,FC FS=1
AK DU2=2,AL DU2=1.25,D  DU2=1.63
TAMDU2=520,HO DU2=1,FC DU2=1
OPEDV1=60,AL DV1=.167
D  DV1=1.63,TAMDV1=520
HO DV1=1,FC DV1=1,VALDV1=1
AK DU3=2,AL DU3=1.68,D  DU3=1.16
TAMDU3=520,HO DU3=1,FC DU3=1
OPEDV2=60,AL DV2=.167
D  DV2=1.16,TAMDV2=520
HO DV2=1,FC DV2=1,VALDV2=1
ANTEJ1=.149,ANEEJ1=.174,AK EJ1=.2
ANTEJ2=.0743,ANEEJ2=.0868,AK EJ2=.2
P2 EJ1=14.7,T2 EJ1=520
T2 EJ2=520
VU TK=60,PA TK=14.7,NE TK=-11
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=286,WLTTK=85.5
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=226,WLCTK=100
TAUTK=.005,AMDTK=0
DMPTK=.02,EPCTK=1
ROLTK=0,PITTK=0,YAWTK=0
X  TK=0,ALTTK=10
U  TK=0,V  TK=0,W  TK=0
P  TK=0,Q  TK=0,R  TK=0
OPEDV3=60,AL DV3=.5,D  DV3=4
TAMDV3=520,HO DV3=1,FC DV3=1,VALDV3=1
INITIAL CONDITIONS
P1 FS=199.9
P1 DV2=199.5
P1 DU3=199
P1 DV1=199.5
P1 DU2=199
P1 EJ1=198
P1 EJ2=198
PT TK=15.82,VT TK=34.6
PC TK=14.7,VC TK=98.
P1 DV3=16
ERROR CONTROLS
P1 FS=.01
P1 DV2=.01
P1 DU3=.01
P1 DV1=.01
P1 DU2=.01
P1 EJ1=.01
P1 EJ2=.01
PT TK=.01
VT TK=.01
```

```
PC TK=.01
VC TK=.01
P1 DV3=.01
PRINT CONTROL=3
LINEAR ANALYSIS
STEADY STATE
X1C-X
LINEAR ANALYSIS
PARAMETER VALUES,OPEDV2=45
STEADY STATE
PARAMETER VALUES,OPEDV2=30
STEADY STATE
```

```
TITLE=  FILE BLABA1
PARAMETER VALUES
MA1DL=49.69,C   DL=3.608,XP1DL=0,ISWDL=3,STADL=0
IXXSG=67,IYYSG=790,IZZSG=570,IXZSG=20,IXYSG=0,IYZSG=0
XO DL=-.056 ,XA DL= -1.89,XU DL= 0,XDEDL= 0
ZA DL=-3.15,ZADDL= 0,ZQ DL=-2.91,ZU DL=0,ZDEDL=-1.272,
ZO DL= -.765,ZDSDL= -1.0
MO DL= .0206,MALDL= -.15,MADDL=0,MQ DL= -15.66,
MU DL=0,MDEDL= -1.805,MDSDL=2.991
B   DL=8.0833,FSPDL=0,SPODL=0
YB DL=-1.158,YBDDL=0,YP DL=.119,YR DL=1.44,YDRDL=.2137,YDADL=0
LDRDL=.064,LB DL=-.1662,LBDDL=0,LP DL=-.235,LR DL=0.49,LDADL=0.1203
NDRDL=-.257,NDADL=-.0722,NB DL=.0516,NBDDL=0,NP DL=.258,NR DL=-1.543
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=26,VS VA=221.2444,ALSVA=0.
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=0
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,930,50000,55000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
1.6,1.6
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE, ABLAB, 3
13,0,31.4,0,90
TABLE, XYZAB, 12
145,2,0
130,2,0
110,2,0
90,2,0
70,2,0
50,2,0
```

```
30,2,0
10,2,0
TABLE, DSMAB, 12
10,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
TABLE, IALAB, 16
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
1,0,10.7,0
TABLE, RELAB, 4
0,.5,1.5,100
0,0,144,144
TABLE,FTAFU2,4
0,15.2,16.2,1000
0,0,144,144
TABLE,FTAFU3,4
0,15.2,16.2,1000
0,0,144,144
TABLE,XYZB,9
95.5,-21.3,14.0
95.5,21.3,14
-50,-48.3,13.5
-50,48.3,13.5
94.4,0,13.5
-92,0,12
TABLE,GAP,3
1,2,3
0,0,0
TABLE,ET AS,5
0,.05,.1,.15,.2
0,22446,50443,85272,128210
TABLE,TABEJ1,15,3
1.34,2.02,3.38
0,1.0,1.02,1.027,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,1.386,10
100,4.06,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
28.3,3.63,3.136,2.86,1.915,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
9.9,2.94,2.77,2.71,2.526,2.42,2.334,1.816,1.01,.432,-.01,-.01,-.01,-.01,-.01
TABLE,TABEJ2,15,3
1.34,2.02,3.38
0,1.0,1.02,1.027,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,1.388,10
100,4.06,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
28.3,3.63,3.136,2.86,1.915,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
9.9,2.94,2.77,2.71,2.526,2.42,2.334,1.816,1.01,.432,-.01,-.01,-.01,-.01,-.01
PARAMETER VALUES
LTRDL=-.079,YTRDL=-.196,NTRDL=-.261
XTRDL=-.0156,MALDL=.25,MTRDL=-.0079
PARAMETER VALUES
```

```
BSCAS=226,WLCAS=100,BSHAS=318,WLHAS=89
LH AS=29,YS AS=100,YM AS=10
HC AS=.5,EC AS=1.3E7,DNCAS=.283
AC AS=.2,ICSAS=2500,DNTAS=.03
THKAS=.15,WDTAS=5,TPOAS=200
RO AS=12.83,IDRAS=30000,DMPAS=.0001,VO AS=221
FINMA A=0,FINMA E=0,FINMA T=0,FINMA R=0
REARMU=.7,FRONTMU=.7,RVCRP=.5,RVSATP=1.5,RVAREA=144.,KOUNT=1
AMASS=49.7,TSWITCH=1.
AN FU2=1
AN FU3=1
PA AB=14.7,VU AB=6,EPCAB=1
NE AB=8,NSTAB=1,NPTAB=10
BSTAB=296,WLTAB=85.5
CD1AB=.6,CDAAB=.9
BSCAB=226,WLCAB=100
TAUAB=.005,AMOAB=0
DMPAB=.02,CD2AB=.2
ANRAB=0,DL AB=0,H  AB=0
W1 EJ1=9,T1 EJ1=560
P2 EJ1=14.7,T2 EJ1=520
ANTEJ1=.354,ANEEJ1=.354,AK EJ1=0
W1 EJ2=9,T1 EJ2=560
P2 EJ2=14.7,T2 EJ2=520
ANTEJ2=.354,ANEEJ2=.354,AK EJ2=0
INITIAL CONDITIONS
P1 EJ1=19.7,P1 EJ2=19.7
G1RAS=0,G2RAS=0,G1LAS=0,G2LAS=0
PTRAB=15.1,VTRAB=12.5
PTLAB=15.1,VTLAB=12.5
U  SG=220.4,V  SG=.67,W  SG=19.1
P  SG=0,Q  SG=0,R  SG=0
ROLSG=2,PITSG=2.56,YAWSG=0
X  SG=-99,Y  SG=0,ALTSG=3.4
ERROR CONTROLS
P1 EJ1=.01,P1 EJ2=.01
G1RAS=.01,G2RAS=.01,G1LAS=.01,G2LAS=.01
PTRAB=.01,VTRAB=.01
PTLAB=.01,VTLAB=.01
U  SG=.01,V  SG=.01,W  SG=.01
P  SG=.01,Q  SG=.01,R  SG=.01
ROLSG=.01,PITSG=.01,YAWSG=.01
X  SG=.01,Y  SG=.01,ALTSG=.01
LINEAR ANALYSIS
NO STATES
INT CONTROL,PTRAB=1,VTRAB=1,PTLAB=1,VTLAB=1
STEADY STATE
X1C-X
ALL STATES
INT CONTROL, P1 EJ1=0,P1 EJ2=0
PRINT CONTROL=3
PRINTER PLOTS
DISPLAY1
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
X  SG,VS,TIME
Y  SG,VS,X  SG
```

```
DISPLAY2
ALTSG,VS,TIME
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
P  SG,VS,TIME
DISPLAY3
Q  SG,VS,TIME
R  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY4
PTRAB,VS,TIME
VTRAB,VS,TIME
PTLAB,VS,TIME
VTLAB,VS,TIME
RELIEFR,VS,TIME
DISPLAY5
RELIEFL,VS,TIME
R22,VS,TIME
GAPCL,VS,TIME
GAPCR,VS,TIME
GAPWL,VS,TIME
DISPLAY6
GAPWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
GAPCG,VS,TIME
W3 EJ1,VS,TIME
TINC=.02,TMAX=3,PRATE=1,INT MODE=5
TITLE=B-ARPV W/ABSS, LANDING W/ FULL AERO., 6 DOF, AND ARRESTMENT
PLOT ID=S.J.BAUMGARTNER, MS 41-47, 655-5260
SIMULATE
```

```
TITLE=  FILE BLACA2
PARAMETER VALUES
MA1DL=49.69,C  DL=3.608,XP1DL=0,ISWDL=3,STADL=0
IXXSG=67,IYYSG=790,IZZSG=570,IXZSG=20,IXYSG=0,IYZSG=0
X0 DL=-.056 ,XA DL= -1.89,XU DL= 0,XDEDL= 0
ZA DL=-3.15,ZADDL= 0,ZQ DL=-2.91,ZU DL=0,ZDEDL=-1.272,
Z0 DL= -.765,ZDSDL= -1.0
M0 DL= .0206,MALDL= -.15,MADDL=0,MQ DL= -15.66,
MU DL=0,MDEDL= -1.805,MDSDL=2.991
B  DL=6.0833,FSPDL=0,SPODL=0
YB DL=-1.158,YBDDL=0,YP DL=.119,YR DL=1.44,YDRDL=.2137,YDADL=0
LDRDL=.064,LB DL=-.1662,LBDDL=0,LP DL=-.235,LR DL=0.49,LDADL=0.1203
NDRDL=-.257,NDADL=-.0722,NB DL=.0516,NBDDL=0,NP DL=.258,NR DL=-1.543
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=26,VS VA=221.2444,ALSVA=0.
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,X0 TG=0,Y0 TG=0,Z0 TG=0
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
P1 ID=14.7,T1 ID=520,SH1ID=0,CO1ID=0
TABLE,TPOID,2
0,1
0,10000
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,930,50000,55000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
1.6,1.6
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE, ABLTK, 2
13,0,40.84,1
TABLE, XYZTK, 22
124.85,.765,0,67.5
123.765,1.85,0,22.5
```

```
115.25,2,0,0
99.75,2,0,0
84.3,2,0,0
68.9,2,0,0
53.5,2,0,0
38.1,2,0,0
22.7,2,0,0
14.235,1.85,0,-22.5
13.15,.765,0,-67.5
TABLE, DSMTK, 17
9.23,1,.2
9.23,1,.2
15.5,1,.2
15.5,1,.2
15.4,1,.7
15.4,1,.7
15.4,1,.7
15.4,1,.7
15.4,1,.7
9.23,1,.7
9.23,1,.7
TABLE, IALTK, 22
1,.0125,13,15
1,.0125,13,15
1,.0125,13,15
1,.0125,13,15
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
TABLE, RELTK, 4
0,1.2,3.2,100
0,0,144,144
TABLE,FTAFU2,4
0,15.9,17.9,1000
0,0,144,144
TABLE,XYZB,9
95.5,-21.3,14.0
95.5,21.3,14
-50,-48.3,13.5
-50,48.3,13.5
94.4,0,13.5
-92,0,12
TABLE,GAP,3
1,2,3
0,0,0
TABLE,TABEJ,13,2
2.02,3.38
0,1,1.02,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,10
28.3,3.63,3.136,1.915,1.01,1,1,1,1,1,1,1,1
9.9,2.94,2.77,2.526,2.42,2.334,1.816,1.01,1,1,1,1,1
TABLE,ETAS,5
0,.05,.1,.15,.2
0,22446,50443,85272,128210
PARAMETER VALUES
```

```
ANTEJ=.354,ANEEJ=.354,AK EJ=0
P2 EJ=14.7,T2 EJ=520,W1 EJ=21.64,T1 EJ=560
LTRDL=-.0748,YTRDL=-.332,NTRDL=-.384,XTROL=-.0276,MALOL=.50
   MTROL=-.0147
PARAMETER VALUES
ANRTK=0,DL TK=0,M  TK=0
BSCAS=226,WLCAS=100,BSHAS=318,WLHAS=89
LH AS=29,YS AS=100,YM AS=10
HC AS=.5,EC AS=1.3E7,DNCAS=.283
AC AS=.2,ICSAS=2500,DNTAS=.03
THKAS=.15,WDTAS=5,TPOAS=200
RO AS=12.83,IDRAS=30000,DMPAS=3.385,V0 AS=221
FINMA A=0,FINMA E=0,FINMA T=0,FINMA R=0
REARMU=.7,FRONTMU=.2,RVCRP=1.2,RVSATP=3.2,RVAREA=144.,KOUNT=1
AMASS=49.7,TSWITCH=1.
AN FU2=1
PA TK=14.7,NE TK=11
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=284.5,WLTTK=85.5
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=226,WLCTK=100,TAUTK=.005
AMOTK=0,DMPTK=.02,EPCTK=1,VU TK=60
INITIAL CONDITIONS
G1RAS=0,G2RAS=0,G1LAS=0,G2LAS=0
PT TK=15.82,VT TK=31.6
PC TK=14.7,VC TK=15.
U  SG=220.4,V  SG=.67,W  SG=19.1
P  SG=0,Q  SG=0,R  SG=0
ROLSG=2,PITSG=2.56,YAWSG=0
X  SG=2,Y  SG=0,ALTSG=3.4
PRINT CONTROL=4
ERROR CONTROLS
PT TK=.01,VT TK=.01
PC TK=.01,VC TK=.01
U  SG=.01,V  SG=.01,W  SG=.01
P  SG=.01,Q  SG=.01,R  SG=.01
ROLSG=.01,PITSG=.01,YAWSG=.01
X  SG=.01,Y  SG=.01,ALTSG=.01
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TK=1,VT TK=1,PC TK=1,VC TK=1
STEADY STATE
XIC-X
ALL STATES
INT CONTROL, P1 EJ=0
PRINT CONTROL=3
PRINTER PLOTS
DISPLAY1
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
X  SG,VS,TIME
Y  SG,VS,X  SG
DISPLAY2
ALTSG,VS,TIME
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
```

```
P  SG,VS,TIME
DISPLAY3
Q  SG,VS,TIME
R  SG,VS,TIME
VTOTAL,VS,TIME
W3 EJ,VS,TIME
LACCEL,VS,TIME
DISPLAY4
PT TK,VS,TIME
VT TK,VS,TIME
PC TK,VS,TIME
ZFORCE,VS,STROKE
RELIEFA,VS,TIME
DISPLAY5
PRATIO,VS,TIME
R20,VS,TIME
GAPCL,VS,TIME
GAPCR,VS,TIME
GAPWL,VS,TIME
DISPLAY6
GAPWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
GAPCG,VS,TIME
W2 IO,VS,TIME
TINC=.02,TMAX=3,PRATE=1,INT MODE=5
TITLE=B-ARPV W/ACRS, LANDING W/ FULL AERO., & DOF, AND ARRESTMENT
PLOT ID=S.J.BAUMGARTNER, MS 41-47, 655-5260
SIMULATE
```

```
TITLE=  FILE BLASB1
PARAMETER VALUES
MA1OL=49.69,C  OL=3.608,XP1OL=0,ISWOL=3,STAOL=0
IXXSG=67,IYYSG=790,IZZSG=570,IXZSG=20,IXYSG=0,IYZSG=0
XO OL=-.056 ,XA OL= -1.89,XU OL= 0,XDEOL= 0
ZA OL=-3.15,ZADOL= 0,ZQ OL=-2.91,ZU OL=0,ZDEOL=-1.272,
ZO OL= -.765,ZDSOL= -1.0
MQ OL= .0206,MALOL= -.15,MADOL=0,MQ OL= -15.66,
MU OL=0,MDEOL= -1.805,MDSOL=2.991
B  DL=8.0833,FSPDL=0,SPOOL=0
YB DL=-1.158,YBDDL=0,YP DL=.119,YR DL=1.44,YDRDL=.2137,YDADL=0
LDRDL=.064,LB DL=-.1662,LBDDL=0,LP DL=-.235,LR DL=0.49,LDADL=0.1203
NDRDL=-.257,NDADL=-.0722,NB DL=.0516,NBDDL=0,NP DL=.258,NR DL=-1.543
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=26,VS VA=221.2444,ALSVA=0.
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=0
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,930,50000,55000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE, ABLTK, 2
13,0,40.84,1
TABLE, XYZTK, 22
106.85,.765,0,67.5
105.765,1.85,0,22.5
98.75,2,0,0
86.25,2,0,0
73.5,2,0,0
60.5,2,0,0
```

```
47.5,2,0,0
34.5,2,0,0
21.5,2,0,0
14.235,1.85,0,-22.5
13.15,.765,0,-67.5
TABLE, DSMTK, 17
9.23,1,.2
9.23,1,.2
12.5,1,.2
12.5,1,.2
13,1,.7
13,1,.7
13,1,.7
13,1,.7
13,1,.7
9.23,1,.7
9.23,1,.7
TABLE, IALTK, 22
1,.0111,10.42,20
1,.0111,10.42,20
1,.00872,10.42,20
1,.00872,10.42,20
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
1,0,20.42,0
TABLE, RELTK, 4
0,1.62,2.7,100
0,0,144,144
TABLE,FTAFU2,4
0,16.32,17.4,1000
0,0,144,144
TABLE,XYZB,9
95.5,-21.3,14.0
95.5,21.3,14
-50,-48.3,13.5
-50,48.3,13.5
94.4,0,13.5
-92,0,12
TABLE,GAP,3
1,2,3
0,0,0
PARAMETER VALUES
LTRDL=-.0748,YTRDL=-.332,NTRDL=-.384,XTRDL=-.0276,MALDL=.50
   MTRDL=-.0147
PARAMETER VALUES
ANRTK=0,DL TK=0,M  TK=0
FINMA A=0,FINMA E=0,FINMA T=0,FINMA R=0
REARMU=.7,FRONTMU=.2,RVCRP=1.62,RVSATP=2.7,RVAREA=144.,KOUNT=1
AMASS=49.7,TSWITCH=0.
AN FU2=1
PA TK=14.7,WCUTK=0,TCUTK=520
WTRTK=120.,TTRTK=520,NE TK=11
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=278.8,WLTTK=85.5
```

```
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=226,WLCTK=100,TAUTK=.005
AMOTK=0,DMPTK=.02,EPCTK=1,VU TK=60
IXXSG=67,IYYSG=790,IZZSG=570
IXZSG=20,IXYSG=0,IYZSG=0
INITIAL CONDITIONS
PT TK=15.82,VT TK=31.6
PC TK=14.7,VC TK=9.87
U  SG=229.16,V  SG=43.42,W  SG=42.3
P  SG=3.56,Q  SG=.8,R  SG=0
ROLSG=4.96,PITSG=8.67,YAWSG=2.96
X  SG=7.5,Y  SG=6.78,ALTSG=3.4
PRINT CONTROL=4
ERROR CONTROLS
PT TK=.01,VT TK=.01
PC TK=.01,VC TK=.01
U  SG=.01,V  SG=.01,W  SG=.01
P  SG=.01,Q  SG=.01,R  SG=.01
ROLSG=.01,PITSG=.01,YAWSG=.01
X  SG=.01,Y  SG=.01,ALTSG=.01
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TK=1,VT TK=1,PC TK=1,VC TK=1
LINEAR ANALYSIS
STEADY STATE
XIC-X
ALL STATES
LINEAR ANALYSIS
PRINT CONTROL=3
PRINTER PLOTS
DISPLAY1
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
X  SG,VS,TIME
Y  SG,VS,TIME
DISPLAY2
ALTSG,VS,TIME
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
P  SG,VS,TIME
DISPLAY3
Q  SG,VS,TIME
R  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY4
PT TK,VS,TIME
VT TK,VS,TIME
PC TK,VS,TIME
VC TK,VS,TIME
RELIEFA,VS,TIME
DISPLAY5
PRATIO,VS,TIME
R20,VS,TIME
GAPCL,VS,TIME
```

```
GAPCR,VS,TIME
GAPWL,VS,TIME
DISPLAY6
GAPWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
GAPCG,VS,TIME
TENERGY,VS,TIME
TINC=.02,TMAX=3,PRATE=1,INT MODE=5
TITLE=B-ARPV W/ACRS, LANDING W/ FULL AERO., 6 DOF, AND ARRESTMENT
PLOT ID=S.J.BAUMGARTNER, MS ~1-~7, 655-5260
SIMULATE
```

```
MODEL DESCRIPTION   BOEING LANDING WITH SUCTION BRAKING, FILE BLMAS03
LOCATION=12,IO
LOCATION=32,FS,INPUTS=IO
LOCATION=34,DV2,INPUTS=FS(2=1)
LOCATION=36,DU3,INPUTS=DV2
LOCATION=52,DV1,INPUTS=FS(3=1)
LOCATION=54,DU2,INPUTS=DV1
FORTRAN STATEMENTS
      P3 EJ1=PT TK
LOCATION=56,EJ1,INPUTS=DU2(2=1)
LOCATION=40,EJ2,INPUTS=DU3(2=1),TK(PC=P,2)
FORTRAN STATEMENTS
      WCUTK=W2 DU3-W3 EJ2
      TCUTK=T2 EJ2
LOCATION=60,TK,INPUTS=EJ1(W,3=WTR,T,3=TTR)
LOCATION=20,DV3,INPUTS=EJ2(3=1)
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION   BOEING LANDING W-O SUCTION BRAKING, FILE BLMAS04
LOCATION=12,IO
LOCATION=52,DV1,INPUTS=IO
LOCATION=54,DU2,INPUTS=DV1
FORTRAN STATEMENTS
      P3 EJ1=PT TK
LOCATION=56,EJ1,INPUTS=DU2(2=1)
LOCATION=60,TK,INPUTS=EJ1(W,3=WTR,T,3=TTR)
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION     BOEING CUSHION LANDING, FILE BLMCA2
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPCL,GAPCR,GAPWL,GAPWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH,ZFORCE,STROKE
ADD TABLES=XYZb,21,GAP,9
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          LANDING APPROACH
C
LOCATION = 65      TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
       VW2 =UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2    +  WW*(SIN(RR)*COS(PP))
       WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
      1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
      2    +  WW*COS(RR)*COS(PP)
       UW VA=UW2
       VW VA=VW2
       WW VA=WW2
LOCATION=46     VA          INPUTS=SG
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
       FINMA2 = SQRT(U  SG**2+V  SG**2+W  SG**2)*SIN(FD MA1*3.14159/180.)
       RPD=.017453
       CALVA=COS(AL VA*RPD)
       SALVA=SIN(AL VA*RPD)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C          GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59      FU       INPUTS=SG(X=FIN)
LOCATION = 67      MA3      INPUTS=SG(ALT=C2),FU(FD=FIN)
FORTRAN STATEMENTS
C
C          COMPONENTS MA E, MA A, MA T, AND  MA R  COMBINE O.C. OUTPUT
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 102     TA
LOCATION = 122     MA E     INPUTS=TA(A2=C2,D2=C1)
LOCATION = 124     MA A     INPUTS=TA(B2=C2,D2=C1)
LOCATION = 126     MA R     INPUTS=TA(C2=C2,D2=C1)
LOCATION = 128     MA T      INPUTS=TA2(D2=C2),TA(D2=C1)
LOCATION = 53     TB
```

```
FORTRAN STATEMENTS
      IF (FO MA E .GT. 15.) FO MA E = 15.
      IF (FO MA E .LT. -40.) FO MA E = -40.
      IF (FO MA T .LT. 300.) FO MA T = 300.
      IF (FO MA T .GT. 970.) FO MA T = 970.
      IF (TSWITCH .LT. 0.1) FO MA T = 0.
      ELEDL = FO MA E
      TH TG = FO MA T
      STADL = A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (FO MA R .GT. 15.) FO MA R = 15.
      IF (FO MA R .LT. -15.) FO MA R = -15.
      AILDL=FO MA A
      RUDDL = FO MA R
LOCATION=34     DL          INPUTS=VA,OL,TG
FORTRAN STATEMENTS
      IF (KOUNT .EQ. 1) WRITE(6,10) (RELTK(I),I=4,11),(DSMTK(I),I=4,36),
     1   (FTAFU2(I),I=4,11)
   10 FORMAT(8E13.5)
      RELTK(5)=RVCRP
      RELTK(6)=RVSATP
      RELTK(10)=RELTK(11)=RVAREA
      DSMTK(6)=DSMTK(9)=DSMTK(12)=DSMTK(15)=FRONTMU
      DSMTK(18)=DSMTK(21)=DSMTK(24)=DSMTK(27)=REARMU
      DSMTK(30)=DSMTK(33)=DSMTK(36)=REARMU
      FTAFU2(5)=14.7*RVCRP
      FTAFU2(6)=14.7*RVSATP
      FTAFU2(10)=FTAFU2(11)=RVAREA
LOCATION=163     EJ     INPUTS=TK(PT=P,3)
LOCATION=174     IO
FORTRAN STATEMENTS
      WTRTK=W3 EJ*2.
LOCATION=142    TK    INPUTS=SG,EJ(T,3=TTR),IO(W,2=WCU,T,2=TCU)
LOCATION = 166     FU2     INPUTS=TK(PT=FIN)
FORTRAN STATEMENTS
      RELIEFA = FO FU2
      PRATIO=(PC TK-PA TK)/(PT TK-PA TK)
LOCATION=130     AS     INPUTS=SG
LOCATION=16    S3
INPUTS=TK(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=DL(2=3),OL(2=3)
INPUTS=AS(FX=FX,1,FY=FY,1,FZ=FZ,1,TX=TX,1,TY=TY,1,TZ=TZ,1)
FORTRAN STATEMENTS
      UD SG=FX+S3/AMASS-(Q  SG*W  SG-R  SG*V  SG)*.01745-
     1       32.2*SIN(PITSG*.01745)
      VD SG=FY+S3/AMASS-(R  SG*U  SG-P  SG*W  SG)*.01745+
     1       32.2*COS(PITSG*.01745)*SIN(ROLSG*.01745)
      WD SG=FZ+S3/AMASS-(P  SG*V  SG-Q  SG*U  SG)*.01745+
     1       32.2*COS(PITSG*.01745)*COS(ROLSG*.01745)
      ZFORCE=-WD SG/32.2
      STROKE=2.442-ALTSG
LOCATION=10    SG    INPUTS=S3(TX,4=TX,TY,4=TY,TZ
TZ)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
     1  +.5*(IXXSG*P  SG*P  SG+IYYSG*Q  SG*Q  SG+IZZSG*R  SG*R  SG
```

```
     2  + IXZSG*P  SG*R  SG)
      PENERGY= (PT TK-PA TK)*VT TK*144. + (PC TK-PA TK)*VC TK*144.
     1   + AMASS*32.2*ALTSG
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(PD SG*PD SG+QD SG*QD SG+RD SG*RD SG)
      LACCEL= (SQRT(UD SG*UD SG+VD SG*VD SG+WD SG*WD SG))/32.2
      VTOTAL=SQRT(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTSG*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=ROLSG
      PITTR=PITSG
      YAWTR=YAWSG
LOCATION = 110     TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTSG*12.+W2 TR
      GAPCL=GAP(4)
      GAPCR=GAP(5)
      GAPWL=GAP(6)
      GAPWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTSG*12. -14.5
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION     BOEING CUSHION LANDING, FILE BLMSB1
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPCL,GAPCR,GAPWL,GAPWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH
ADD TABLES=XYZB,21,GAP,9
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          LANDING APPROACH
C
LOCATION = 65      TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
       VW2 =UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2    +  WW*(SIN(RR)*COS(PP))
       WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
      1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
      2    +  WW*COS(RR)*COS(PP)
       UW VA=UW2
       VW VA=VW2
       WW VA=WW2
LOCATION=46     VA          INPUTS=SG
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
       FINMA2 = VT VA*SIN(FO MA1*3.14159/180.)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C          GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59      FU       INPUTS=SG(X=FIN)
LOCATION = 67      MA3      INPUTS=SG(ALT=C2),FU(FO=FIN)
FORTRAN STATEMENTS
C
C          COMPONENTS MA E, MA A, MA T, AND  MA R  COMBINE O.C. OUTPUT
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 102     TA
LOCATION = 122     MA E     INPUTS=TA(A2=C2,D2=C1)
LOCATION = 124     MA A     INPUTS=TA(B2=C2,D2=C1)
LOCATION = 126     MA R     INPUTS=TA(C2=C2,D2=C1)
LOCATION = 128     MA T      INPUTS=TA2(D2=C2),TA(D2=C1)
LOCATION = 53     TB
FORTRAN STATEMENTS
       IF (FO MA E .GT. 15.) FO MA E = 15.
       IF (FO MA E .LT. -40.) FO MA E = -40.
```

```
      IF (FO MA T .LT. 300.) FO MA T = 300.
      IF (FO MA T .GT. 970.) FO MA T = 970.
      IF (TSWITCH .LT. 0.1) FO MA T = 0.
      ELEDL = FO MA E
      TH TG = FO MA T
      STADL = A2 TB
LOCATION = 51     TG
LOCATION=2      DL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (FO MA R .GT. 15.) FO MA R = 15.
      IF (FO MA R .LT. -15.) FO MA R = -15.
      AILDL=FO MA A
      RUDDL = FO MA R
LOCATION=34     DL          INPUTS=VA,DL,TG
FORTRAN STATEMENTS
      IF (KOUNT .EQ. 1) WRITE(6,10) (RELTK(I),I=4,11),(DSMTK(I),I=4,36),
     1   (FTAFU(I),I=4,11)
   10 FORMAT(8E13.5)
      RELTK(5)=RVCRP
      RELTK(6)=RVSATP
      RELTK(10)=RELTK(11)=RVAREA
      DSMTK(6)=DSMTK(9)=DSMTK(12)=DSMTK(15)=FRONTMU
      DSMTK(18)=DSMTK(21)=DSMTK(24)=DSMTK(27)=REARMU
      DSMTK(30)=DSMTK(33)=DSMTK(36)=REARMU
      FTAFU(5)=14.7+RVCRP
      FTAFU(6)=14.7+RVSATP
      FTAFU(10)=FTAFU(11)=RVAREA
LOCATION=142    TK    INPUTS=SG
LOCATION = 166     FU2     INPUTS=TK(PT=FIN)
FORTRAN STATEMENTS
      RELIEFA = FO FU2
      PRATIO=(PC TK-PA TK)/(PT TK-PA TK)
      FX1S3 = 0
      FY1S3 = 0
      FZ1S3 = 0
      TX1S3 = 0
      TY1S3 = 0
      TZ1S3 = 0
LOCATION=16   S3
INPUTS=TK(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,T
TY,2,TZT=TZ,2)
INPUTS=DL(2=3),DL(2=3)
FORTRAN STATEMENTS
      UD SG=FX4S3/AMASS-(Q  SG*W  SG-R  SG*V  SG)*.01745-
     1       32.2*SIN(PITSG*.01745)
      VD SG=FY4S3/AMASS-(R  SG*U  SG-P  SG*W  SG)*.01745+
     1       32.2*COS(PITSG*.01745)*SIN(ROLSG*.01745)
      WD SG=FZ4S3/AMASS-(P  SG*V  SG-Q  SG*U  SG)*.01745+
     1       32.2*COS(PITSG*.01745)*COS(ROLSG*.01745)
LOCATION=10   SG   INPUTS=S3(TX,4=TX,TY,4=TY,TZ,4=TZ)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
     1  +.5*(1XXSG*P  SG*P  SG+IYYSG*Q  SG*Q  SG+IZZSG*R  SG*R  SG
     2  + IXZSG*P  SG*R  SG)
      PENERGY= (PT TK-PA TK)*VT TK*144. + (PC TK-PA TK)*VC TK*144.
     1   + AMASS*32.2*ALTSG
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
```

```
      AACCEL=SQRT(PD SG*PD SG+QD SG*QD SG+RD SG*RD SG)
      LACCEL= (SQRT(UD SG*UD SG+VD SG*VD SG+WD SG*WD SG))/32.2
      VTOTAL=SQRT(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTSG*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=ROLSG
      PITTR=PITSG
      YAWTR=YAWSG
LOCATION = 110     TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTSG*12.+W2 TR
      GAPCL=GAP(4)
      GAPCR=GAP(5)
      GAPWL=GAP(6)
      GAPWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTSG*12. -14.5
END OF MODEL
PRINT
```

```
TITLE=            FILE  RDABN2
PARAMETER VALUES
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=129.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IYYTL=2680
XO DL=-.032 ,XA DL= -1.203,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADDL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
ZO DL=-.480
MO DL=.0038,MALDL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
ZSPDL=.25
IDIVA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
TABLE,A2TTB,2
0,50
0,0
TABLE,A2TTA,2
0,50
-6,-6
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLAB, 3
21.7,59.7,30,150
TABLE, XYZAB, 12
150,9,0
130,9,0
110,9,0
90,9,0
70,9,0
50,9,0
30,9,0
10,9,0
TABLE, DSMAB, 12
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
```

```
20,1,.7
TABLE, IALAB, 16
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
TABLE, RELAB, 4
0,1.1,2.1,100
0,0,144,144
TABLE,FTAFU2,4
0,15.8,16.8,1000
0,0,144,144
TABLE,FTAFU3,4
0,15.8,16.8,1000
0,0,144,144
TABLE,TABEJ1,15,4
1.34,2.02,3.38,5.76
0,1.0,1.02,1.027,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,1.388,10
100,4.06,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
28.3,3.63,3.136,2.86,1.915,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
9.9,2.94,2.77,2.71,2.526,2.42,2.334,1.816,1.01,.432,-.01,-.01,-.01,-.01,-.01
3.8,2.53,2.5,2.49,2.46,2.43,2.4,2.29,2.11,1.98,1.89,1.38,1.01,-.01,-.01
TABLE,TABEJ2,15,4
1.34,2.02,3.38,5.76
0,1.0,1.02,1.027,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,1.388,10
100,4.06,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
28.3,3.63,3.136,2.86,1.915,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
9.9,2.94,2.77,2.71,2.526,2.42,2.334,1.816,1.01,.432,-.01,-.01,-.01,-.01,-.01
3.8,2.53,2.5,2.49,2.46,2.43,2.4,2.29,2.11,1.98,1.89,1.38,1.01,-.01,-.01
PARAMETER VALUES
V  VA=0
P  VA=0,R  VA=0,ROLVA=0
C2 MA T=600
SPOOL=0
ROLAB=0,YAWAB=0
X  AB=0,V  AB=0
P  AB=0,R  AB=0
ROLTL=0
YAWTL=0
ANTEJ1=.354,ANEEJ1=.354,AK EJ1=0
P2 EJ1=14.7,T2 EJ1=520
W1 EJ1=18.42,T1 EJ1=560
ANTEJ2=.354,ANEEJ2=.354,AK EJ2=0
P2 EJ2=14.7,T2 EJ2=520
W1 EJ2=18.42,T1 EJ2=560
TSWITCH=1.
XIROL=-.00812,MALOL=-.114,MTROL=-.00314
FINMA E=0,FINMA T=0
REARMU=.7,FRONTMU=.7,RVCRP=1.1,RVSATP=2.1,RVAREA=144,KOUNT=1
AN FU2=1
AN FU3=1
AMASS=129.5
PA AB=14.7,VU AB=6,EPCAB=1
NE AB=-8,NSTAB=1,NPTAB=10
```

```
BSTAB=236.6,WLTAB=76
CD1AB=.6,CDAAB=.9
BSCAB=168.6,WLCAB=107.5
TAUAB=.005,AMOAB=0
ANRAB=0,DL AB=0,M  AB=0
DMPAB=.02,CD2AB=.2
INITIAL CONDITIONS
PTRAB=15.7,VTRAB=45
PTLAB=15.7,VTLAB=45
P1 EJ1=29.7,P1 EJ2=29.7
Q  TL=0
PITTL=0,U  TL=135
 TL=20
ALTTL=5
PRINT CONTROL=4
PRINTER PLOTS
ERROR CONTROLS
PTRAB=.01,PTLAB=.01
VTRAB=.01,VTLAB=.01
P1 EJ1=.01,P1 EJ2=.01
W  TL=.01,Q  TL=.01
U  TL=.01
PITTL=.01,ALTTL=.01
LINEAR ANALYSIS
NO STATES
INT CONTROL, PTRAB=1,VTRAB=1
STEADY STATE
XIC-X
ALL STATES
INT CONTROL, P1 EJ1=0,P1 EJ2=0,PTLAB=0,VTLAB=0
DISPLAY1
PITTL,VS,TIME
ALTTL,VS,TIME
W  TL,VS,TIME
Q  TL,VS,TIME
VTOTAL,VS,TIME
DISPLAY2
AACCEL,VS,TIME
LACCEL,VS,TIME
PTRAB,VS,TIME
VTRAB,VS,TIME
AL VA,VS,TIME
DISPLAY3
W3 EJ1,VS,TIME
RELIEFR,VS,TIME
PTRAB,VS,W3 EJ1
R11,VS,TIME
FZ2OL,VS,TIME
DISPLAY4
FX2OL,VS,TIME
GAPRWF,VS,TIME
GAPRWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
DISPLAY5
GAPCG,VS,TIME
ZFORCE,VS,TIME
ZFORCE,VS,STROKE
```

```
STROKE,VS,TIME
WRELR,VS,TIME
DISPLAY6
FXTAB,VS,TIME
FZTAB,VS,TIME
XACCEL,VS,TIME
U  TL,VS,TIME
TINC=.02,TMAX=1,PRATE=1,INT MODE=5
TITLE=R-ARPV W/ABSS, LANDING SIMULATION WITH 3 DOF, MAX. PITCH LDG.
PLOT ID = S.J.BAUMGARTNER,MS 41-47,655-5260
SIMULATE
```

```
TITLE=            FILE  RDACE2
PARAMETER VALUES
P1 IO2=14.7,T1 IO2=520,SH1IO2=0,CO1IO2=0
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1OL=129.4,C  OL=6.46,XP1OL=0,ISWOL=3,STAOL=0
IYYTL=2680
XO OL=-.032 ,XA OL= -1.203,XU OL= 0,XDEOL= 0
ZA OL=-4.011,ZADOL= 0,ZQ OL=0,ZU OL=0,ZDEOL=-1.146,
ZO OL=-.480
MO OL=.0038,MALOL=-.464,MADOL=-3.5,MQ OL=-6.,
MU OL=0,MDEOL=-1.748
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
AN FU2=1
TABLE,TPO1O2,2
0,1
0,10000
TABLE,A2TTB,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLTS, 9
21,7,24,.05,.01,.3
21,7,24,.05,.01,.3
21,7,24,.05,.01,.3
TABLE, XYZTS, 16
136.41,3.44,0,67.5
133.54,8.31,0,22.5
118.45,9,0,0
94,9,0,0
68.4,9,0,0
42.8,9,0,0
26.56,8.31,0,-22.5
21.69,3.44,0,-67.5
TABLE, DM TS, 8
45,.2
```

```
45,.2
23.2,.2
25.6,.7
25.6,.7
25.6,.7
45,.7
45,.7
TABLE, IALTS, 16
1,.0282,11,4
2,.0282,11,4
3,.0282,11,4
3,0,0,0
3,0,0,0
3,0,0,0
2,0,0,0
1,0,0,0
TABLE, RELTS, 4
0,1.8,3.8,100
0,0,144,144
TABLE,ENDTS,2
9,0
9,0
TABLE,SPHTS,3,3
1,2,3
0,5,25
0,1.58,1.6
0,1.58,1.6
0,.8,2
TABLE,STHTS,2,3
1,2,3
0,27
0,1
0,1
0,1
TABLE,BWTTS,4
238.6,69,168.6,107.5
0,0,0,0
TABLE,FTAFU2,4
0,16.5,18.5,1000
0,0,144,144
TABLE,PR FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
1.4,1.16,1.159,1.158.1.157,1.154,1.14,1.09,1.,1,1
1.4,1.09,1.08,1.07,1.027,1,1,1,1,1,1
TABLE,ET FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
.01,.15,.35,.6,.76,.8,.8,.6,.01,.01,.01
.01,.05,.6,.7,.4,.01,.01,.01,.01,.01,.01
PARAMETER VALUES
V  VA=0
P  VA=0,R  VA=0,ROLVA=0
UW VA=0,VW VA=0,WW VA=0
EN FR=7,UA FR=1,TAMFR=520
TSWITCH=1
XTROL=-.0176,MALOL=-.178,MTROL=-.008
PARAMETER VALUES
```

```
FINMA E=0,FINMA T=0
REARMU=.7,FRONTMU=.2,RVCRP=1.8,RVSATP=3.8,RVAREA=144.,KOUNT=1
AMASS=129.5
ANETS=-8,PA TS=14.7
PTMTS=2,CAVTS=0,SPBTS=0
CDGTS=.9
WCUTS=0,TCUTS=520
CD1TS=.6,CD2TS=.2,CDATS=.9
TAUTS=.1,VU TS=6
DMPTS=.02,EPCTS=1
C2 MA T=600
SPOOL=0
ROLTS=0
YAWTL=0
YAWTS=0
X  TS=0
V  TS=0
P  TS=0
R  TS=0
ROLTL=0
INITIAL CONDITIONS
PT TS=16.2,VT TS=97
PC TS=14.701,VC TS=36
P1 FR=14.4
W  TL=7
Q  TL=0
U  TL=135
PITTL=0
ALTTL=5.5
ERROR CONTROLS
P1 FR=.0001
PT TS=.0001
VT TS=.0001
PC TS=.0001
VC TS=.0001
W  TL=.0001
Q  TL=.0001
U  TL=.0001
PITTL=.0001
ALTTL=.0001
PRINT CONTROL=4
PRINTER PLOTS
LINEAR ANALYSIS
NO STATES
INT CONTROL,PT TS=1,VT TS=1,PC TS=1,VC TS=1,P1 FR=1
STEADY STATE
XIC-X
DISPLAY1
W2 FR,VS,PT TS
T2 FR,VS,PT TS
WTATS,VS,PT TS
WTRO,VS,PT TS
WTCTS,VS,PT TS
ALL STATES
DISPLAY1
PITTL,VS,TIME
ALTTL,VS,TIME
W  TL,VS,TIME
```

```
Q  TL,VS,TIME
VTOTAL,VS,TIME
DISPLAY

TY4S3,VS,TIME
LACCEL,VS,TIME
PT TS,VS,TIME
VT TS,VS,TIME
PC TS,VS,TIME
DISPLAY3
VC TS,VS,TIME
RELIEFA,VS,TIME
PRATIO,VS,TIME
RIO,VS,TIME
ZFORCE,VS,STROKE
DISPLAY4
STROKE,VS,TIME
GAPRWF,VS,TIME
GAPRWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
DISPLAY5
GAPCG,VS,TIME
W2 FR,VS,TIME
WTRO,VS,TIME
WREL,VS,TIME
DISPLAY6
WTCTS,VS,TIME
WTRO,VS,PT TS
WTCTS,VS,PT TS
W2 FR,VS,PT TS
INITIAL TIME=0,TINC=.02,TMAX=1,PRATE=1
INT MODE=6
TITLE=R-ARPV W/ELASTIC ACRS, 3 DOF LANDING SIMULATION, MAX. PITCH LDG.
PLOT ID = J.G.BRISTER,MS 41-47,655-5260
SIMULATE
```

```
TITLE=            FILE  RDACN2
PARAMETER VALUES
P1 IO2=14.7,T1 IO2=520,SH1IO2=0,CO1IO2=0
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1OL=129.4,C  OL=6.46,XP1OL=0,ISWOL=3,STAOL=0
IYYTL=2680
XO OL=-.032 ,XA OL= -1.203,XU OL= 0,XDEOL= 0
ZA OL=-4.011,ZADOL= 0,ZQ OL=0,ZU OL=0,ZDEOL=-1.146,
ZO OL=-.480
MO OL=.0038,MALOL=-.464,MADOL=-3.5,MQ OL=-6.,
MU OL=0,MDEOL=-1.748
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
AN FU2=1
TABLE,TPO1O2,2
0,1
0,10000
TABLE,A2TTB,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLTK, 2
18,3,56.58,1
TABLE, XYZTK, 16
85.39,3.06,0,67.5
81.06,7.39,0,22.5
75,8,0,0
65,8,0,0
51,8,0,0
37,8,0,0
26.94,7.39,0,-22.5
22.61,3.06,0,-67.5
TABLE, DSMTK, 12
14.14,1,.2
14.14,1,.2
6,1,.2
```

```
14,1,.7
14,1,.7
14,1,.7
14.14,1,.7
14.14,1,.7
TABLE, IALTK, 16
1,.0125,18.3,20
1,.0125,18.3,20
1,.0125,18.3,20
1,0,39.22,0
1,0,39.22,0
1,0,39.22,0
1,0,39.22,0
1,0,39.22,0
TABLE, RELTK, 4
0,1.2,3.2,100
0,0,144,144
TABLE,FTAFU2,4
0,15.9,17.9,1000
0,0,144,144
TABLE,PR FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
1.4,1.16,1.159,1.158,1.157,1.154,1.14,1.09,1.,1,1
1.4,1.09,1.08,1.07,1.027,1,1,1,1,1,1
TABLE,ET FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
.01,.15,.35,.6,.75,.8,.8,.6,.01,.01,.01
.01,.05,.6,.7,.4,.01,.01,.01,.01,.01,.01
PARAMETER VALUES
V  VA=0
P  VA=0,R  VA=0,ROLVA=0
UW VA=0,VW VA=0,WW VA=0
EN FR=5.5,UA FR=1,TAMFR=520
TSWITCH=1
XTROL=-.0176,MALOL=-.178,MTROL=-.008
PARAMETER VALUES
FINMA E=0,FINMA T=0
REARMU=.7,FRONTMU=.2,RVCRP=1.2,RVSATP=3.2,RVAREA=144.,KOUNT=1
AMASS=129.5
ANRTK=0,DL TK=0,H  TK=0
NE TK=-8,PA TK=14.7
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=217.6,WLTTK=76
WCUTK=0,TCUTK=520
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=168.6,WLCTK=107.5,TAUTK=.005,VU TK=6
AMOTK=0,DMPTK=.02,EPCTK=1
C2 MA T=600
SPOOL=0
ROLTK=0
YAWTL=0
YAWTK=0
X  TK=0
V  TK=0
P  TK=0
R  TK=0
```

```
ROLTL=0
INITIAL CONDITIONS
PT TK=15.93,VT TK=93.9
PC TK=14.7,VC TK=46.1
P1 FR=14.7
W  TL=24.4
Q  TL=0
U  TL=133.6
PITTL=4
ALTTL=5.0
PRINT CONTROL=4
PRINTER PLOTS
LINEAR ANALYSIS
NO STATES
INT CONTROL,PT TK=1,VT TK=1,PC TK=1,VC TK=1,P1 FR=1
STEADY STATE
XIC-X
INT CONTROL, PT TK=0
SS PARAMETER=PT TK,IC
SS START=15.
SS STOP=18.
SS POINTS=7
DISPLAY1
W2 FR,VS,PT TK
T2 FR,VS,PT TK
WTATK,VS,PT TK
WTRO,VS,PT TK
WTCTK,VS,PT TK
ALL STATES
DISPLAY1
PITTL,VS,TIME
ALTTL,VS,TIME
W  TL,VS,TIME
Q  TL,VS,TIME
VTOTAL,VS,TIME
DISPLAY2
TY4S3,VS,TIME
LACCEL,VS,TIME
PT TK,VS,TIME
VT TK,VS,TIME
PC TK,VS,TIME
DISPLAY3
VC TK,VS,TIME
RELIEFA,VS,TIME
PRATIO,VS,TIME
R10,VS,TIME
ZFORCE,VS,STROKE
DISPLAY4
STROKE,VS,TIME
GAPRWF,VS,TIME
GAPRWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
DISPLAY5
GAPCG,VS,TIME
W2 FR,VS,TIME
WTRO,VS,TIME
WREL,VS,TIME
```

```
DISPLAY6
WTCTK,VS,TIME
WTRO,VS,PT TK
WTCTK,VS,PT TK
W2 FR,VS,PT TK
TINC=.02,TMAX=1,PRATE=1,INT MODE=5
TITLE=R-ARPV W/ACRS, 3 DOF LANDING SIMULATION, MAX. PITCH LDG.
PLOT ID = S.J.BAUMGARTNER,MS 41-47,655-5260
SIMULATE
```

```
TITLE=          FILE  RDACN3 ,  R-IACS LANDING MODEL
PARAMETER VALUES
PI IO2=14.7,TI IO2=520,SMIIO2=0,COIIO2=0
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MAIOL=129.4,C  OL=6.46,XPIOL=0,ISWOL=3,STAOL=0
IYYTL=2680
XO OL=-.032 ,XA OL= -1.203,XU OL= 0,XDEOL= 0
ZA OL=-4.011,ZADOL= 0,ZQ OL=0,ZU OL=0,ZDEOL=-1.146,
ZO OL=-.480
MO OL=.0038,MALOL=-.464,MADOL=-3.5,MQ OL=-6.,
MU OL=0,MDEOL=-1.748
IDIVA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
AN FU2=1
TABLE,TPOIO2,2
0,1
0,10000
TABLE,A2TTB,2
0,50
0,0
TABLE,A2TTA,5
0,.05,.15,.25,50
-6,-6,-15,0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLTK, 2
18,3,68.1,1
TABLE, XYZTK, 16
126.489,3.06,0,67.5
122.16,7.39,0,22.5
109.25,8,0,0
87.83,8,0,0
64.7,8,0,0
41.567,8,0,0
26.94,7.39,0,-22.5
22.61,3.06,0,-67.5
TABLE, DSMTK, 12
19.2,1,.2
19.2,1,.2
19.7,1,.2
```

```
23.133,1,.7
23.133,1,.7
23.133,1,.7
19.2,1,.7
19.2,1,.7
TABLE, IALTK, 16
1,.0266,31.55,20
1,.0266,31.55,20
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
TABLE, RELTK, 4
0,1.2,3.2,100
0,0,144,144
TABLE,FTAFU2,4
0,15.9,17.9,1000
0,0,144,144
TABLE,PR FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
1.4,1.16,1.159,1.158,1.157,1.154,1.14,1.09,1.,1,1
1.4,1.09,1.08,1.07,1.027,1,1,1,1,1,1
TABLE,ET FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
.01,.15,.35,.6,.76,.8,.8,.6,.01,.01,.01
.01,.05,.6,.7,.4,.01,.01,.01,.01,.01,.01
PARAMETER VALUES
V  VA=0
P  VA=0,R  VA=0,ROLVA=0
UW VA=0,VW VA=0,WW VA=0
EN FR=6.5,UA FR=1,TAMFR=520
TSWITCH=1
XTROL=-.0176,MALOL=-.178,MTROL=-.008
PARAMETER VALUES
FINMA E=0,FINMA T=0
REARMU=.7,FRONTMU=.2,RVCRP=1.2,RVSATP=3.2,RVAREA=144.,KOUNT=1
AMASS=129.5
ANRTK=0,DL TK=0,H  TK=0
NE TK=-8,PA TK=14.7
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=233.15,WLTTK=76
WCUTK=0,TCUTK=520
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=168.6,WLCTK=107.5,TAUTK=.005,VU TK=6
AMOTK=0,DMPTK=.02,EPCTK=1
C2 MA T=600
SPOOL=0
ROLTK=0
YAWTL=0
YAWTK=0
X  TK=0
V  TK=0
P  TK=0
R  TK=0
```

```
ROLTL=0
INITIAL CONDITIONS
PT TK=15.93,VT TK=93.9
PC TK=14.7,VC TK=46.1
P1 FR=14.7
W  TL=29.76
Q  TL=0
U  TL=131.9
PITTL=9.75
ALTTL=5.0
PRINT CONTROL=4
PRINTER PLOTS
LINEAR ANALYSIS
NO STATES
INT CONTROL,PT TK=1,VT TK=1,PC TK=1,VC TK=1,P1 FR=1
STEADY STATE
XIC-X
INT CONTROL, PT TK=0
SS PARAMETER=PT TK,IC
SS START=15.
SS STOP=18.
SS POINTS=7
DISPLAY1
W2 FR,VS,PT TK
T2 FR,VS,PT TK
WTATK,VS,PT TK
WTRO,VS,PT TK
WTCTK,VS,PT TK
STEADY STATE
ALL STATES
DISPLAY1
PITTL,VS,TIME
ALTTL,VS,TIME
W  TL,VS,TIME
Q  TL,VS,TIME
VTOTAL,VS,TIME
DISPLAY2
TY4S3,VS,TIME
LACCEL,VS,TIME
PT TK,VS,TIME
VT TK,VS,TIME
PC TK,VS,TIME
DISPLAY3
VC TK,VS,TIME
RELIEFA,VS,TIME
PRATIO,VS,TIME
R10,VS,TIME
ZFORCE,VS,STROKE
DISPLAY4
STROKE,VS,TIME
GAPRWF,VS,TIME
GAPRWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
DISPLAY5
GAPCG,VS,TIME
W2 FR,VS,TIME
WTRO,VS,TIME
```

```
WREL,VS,TIME
DISPLAY6
WTCTK,VS,TIME
WTRO,VS,PT TK
WTCTK,VS,PT TK
W2 FR,VS,PT TK
TINC=.02,TMAX=1,PRATE=1,INT MODE=5
TITLE=R-ARPV W/IACS, 3 DOF LANDING SIMULATION, MAX. PITCH LDG.
PLOT ID = S.J.BAUMGARTNER,MS 41-47,655-5260
SIMULATE
```

```
MODEL DESCRIPTION, ROCKWELL ABSS 3 DOF LANDING, FILE RDMBN2
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,VTOTAL,RELIEFR,RELIEFL,,AACCEL,LACCEL,
   GAPLWF,GAPRWF,GAPLWR,GAPRWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH,
   ZFORCE,STROKE,WRELR,WRELL,XACCEL
ADD TABLES=XYZB,21,GAP,9
LOCATION=56     VA          INPUTS=TL
LOCATION = 80     TA
LOCATION = 66     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 68     MA T     INPUTS=TA(D2=C1)
LOCATION = 63     TB
FORTRAN STATEMENTS
       RPD=.01745324
       CALVA=COS(AL VA*RPD)
       SALVA=SIN(AL VA*RPD)
       IF (FO MA E .GT. 20.) FO MA E = 20.
       IF (FO MA E .LT. -20.) FO MA E = -20.
       IF (FO MA T .LT. 600.
O MA T = 600.
       IF (FO MA T .GT. 3000.) FO MA T = 3000.
       IF (TSWITCH .LT. 0.1) FO MA T = 0.
       ELEOL = FO MA E
       TH TG = FO MA T
       SPOOL=A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
       IF (KOUNT .EQ. 1) WRITE(6,10) (RELAB(I),I=4,11),(DSMAB(I),I=4,27),
     1   (FTAFU2(I),I=4,11),(FTAFU3(I),I=4,11)
   10 FORMAT(8E13.5)
       RELAB(5)=RVCRP
       RELAB(6)=RVSATP
       RELAB(10)=RELAB(11)=RVAREA
       DSMAB(6)=DSMAB(9)=FRONTMU
       DSMAB(12)=DSMAB(15)=DSMAB(18)=DSMAB(21)=DSMAB(24)=DSMAB(27)=REARMU
       FTAFU2(5)=14.7+RVCRP
       FTAFU2(6)=14.7+RVSATP
       FTAFU2(10)=FTAFU2(11)=RVAREA
       FTAFU3(5)=14.7+RVCRP
       FTAFU3(6)=14.7+RVSATP
       FTAFU3(10)=FTAFU3(11)=RVAREA
       VTLAB=VTRAB
       PTLAB=PTRAB
LOCATION=45,EJ1,INPUTS=AB(PTR=P,3)
LOCATION=43,EJ2,INPUTS=AB(PTL=P,3)
LOCATION=24    AB    INPUTS=TL
INPUTS=EJ1(W,3=WTR,T,3=TTR)
INPUTS=EJ2(W,3=WTL,T,3=TTL)
LOCATION = 36     FU2      INPUTS=AB(PTR=FIN)
LOCATION=38     FU3     INPUTS=AB(PTL=FIN)
FORTRAN STATEMENTS
       RELIEFR = FO FU2
       RELIEFL=FO FU3
       CALL FNFLOW (PTRAB,PA AB,T3 EJ1,CDAAB*RELIEFR,1.,FN,WRELR)
       CALL FNFLOW (PTLAB,PA AB,T3 EJ2,CDAAB*RELIEFL,1.,FN,WRELL)
       FX1S3=0
       FY1S3=0
       FZ1S3=0
```

```
      TX1S3=0
      TY1S3=0
      TZ1S3=0
      FY3S3=0
      TX3S3=0
      TZ3S3=0
LOCATION=16    S3
INPUTS=AB(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=OL(2=3)
FORTRAN STATEMENTS
      UD TL=FX4S3/AMASS-(Q  TL*W  TL)*.01745-
     1       32.2*SIN(PITTL*.01745)
      WD TL=FZ4S3/AMASS-(-Q  TL*U  TL)*.01745+
     1       32.2*COS(PITTL*.01745)*COS(ROLTL*.01745)
LOCATION=10    TL    INPUTS=S3(TY,4=TY)
FORTRAN STATEMENTS
      ZFORCE=-WD TL/32.2
      STROKE=4.427-ALTTL
      KENERGY=.5*AMASS*(U  TL*U  TL+W  TL*W  TL)
     1  +.5*(IYYTL*Q  TL*Q  TL)
      PENERGY= (PTRAB-PA AB)*VTRAB*144. + (PTLAB-PA AB)*VTLAB*144.
     1    + AMASS*32.2*ALTTL
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(QD TL*QD TL)
      XACCEL=EU VA*COS(PITTL)+EW VA*SIN(PITTL)
      LACCEL= (SQRT(UD TL*UD TL+WD TL*WD TL))/32.2
      VTOTAL=SQRT(U  TL*U  TL+W  TL*W  TL)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTTL*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=0
      PITTR=PITTL
      YAWTR=0
LOCATION = 63    TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTTL*12.+W2 TR
      GAPLWF=GAP(4)
      GAPRWF=GAP(5)
      GAPLWR=GAP(6)
      GAPRWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTTL*12. -31.5
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION     ROCKWELL ELASTIC CUSHION LANDING, FILE RDMCE2
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPLWF,GAPRWF,GAPLWR,GAPRWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH,WREL,WTRO,
   ZFORCE,STROKE,XACCEL
ADD TABLES=XYZB,21,GAP,9
LOCATION=56     VA          INPUTS=TL
LOCATION = 80     TA
LOCATION = 66     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 68     MA T     INPUTS=TA(D2=C1)
LOCATION = 63     TB
FORTRAN STATEMENTS
       IF (FO MA E .GT. 20.) FO MA E = 20.
       IF (FO MA E .LT. -20.) FO MA E = -20.
       IF (FO MA T .LT. 600.) FO MA T = 600.
       IF (FO MA T .GT. 3000.) FO MA T = 3000.
       IF (TSWITCH .LT. .1) FO MA T = 0.
       ELEOL = FO MA E
       TH TG = FO MA T
       SPOOL=A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
       IF (KOUNT .EQ. 1) WRITE(6,10) (RELTS(I),I=4,11),(DM TS(I),I=4,19),
      1     (FTAFU2(I),I=4,11)
   10 FORMAT(8E13.5)
       RELTS(5)=RVCRP
       RELTS(6)=RVSATP
       RELTS(10)=RELTS(11)=RVAREA
       DM TS(5)=DM TS(7)=DM TS(9)=FRONTMU
       DM TS(11)=DM TS(13)=DM TS(15)=DM TS(17)=REARMU
       DM TS(19)=REARMU
       FTAFU2(5)=14.7+RVCRP
       FTAFU2(6)=14.7+RVSATP
       FTAFU2(10)=FTAFU2(11)=RVAREA
       P2 IO2 = P1 FR
LOCATION=37     IO2
LOCATION=43     FR     INPUTS=TS(PT=P,2),IO2(2=1)
FORTRAN STATEMENTS
       WTRTS=W2 FR*2.
LOCATION=24    TS    INPUTS=TL,FR(T,2=TTR)
LOCATION = 35     FU2     INPUTS=TS(PT=FIN)
FORTRAN STATEMENTS
       RELIEFA = FO FU2
       PRATIO=(PC TS-PA TS)/(PT TS-PA TS)
       CALL FNFLOW(PT TS,PA TS,T2 FR,C
       WTRO=WTATS+WTCTS
       FX1S3 = 0
       FY1S3 = 0
       FZ1S3 = 0
       TX1S3 = 0
       TY1S3 = 0
       TZ1S3 = 0
       FY3S3=0
       TX3S3=0
       TZ3S3=0
LOCATION=6    S3
INPUTS=TS(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
```

```
INPUTS=OL(2=3)
FORTRAN STATEMENTS
      UD TL=FX4S3/AMASS-(Q  TL*W  TL)*.01745-
     1       32.2*SIN(PITTL*.01745)
      WD TL=FZ4S3/AMASS-(-Q  TL*U  TL)*.01745+
     1       32.2*COS(PITTL*.01745)*COS(ROLTL*.01745)
      ZFORCE = -WD TL/32.2
      STROKE = 45. - ALTTL*12.
LOCATION=10   TL   INPUTS=S3(TY,4=TY)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  TL*U  TL+W  TL*W  TL)
     1  +.5*(IYYTL*Q  TL*Q  TL)
      PENERGY= (PT TS-PA TS)*VT TS*144. + (PC TS-PA TS)*VC TS*144.
     1   + AMASS*32.2*ALTTL
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(QD TL*QD TL)
      LACCEL= (SQRT(UD TL*UD TL+WD TL*WD TL))/32.2
      VTOTAL=SQRT(U  TL*U  TL+W  TL*W  TL)
      XACCEL=EU VA*COS(PITTL) + EW VA*SIN(PITTL)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTTL*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=0
      PITTR=PITTL
      YAWTR=0
LOCATION = 63    TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTTL*12.+W2 TR
      GAPLWF=GAP(4)
      GAPRWF=GAP(5)
      GAPLWR=GAP(6)
      GAPRWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTTL*12. -31.5
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION      ROCKWELL CUSHION LANDING, FILE RDMCN2
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPLWF,GAPRWF,GAPLWR,GAPRWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH,WREL,WTRO,
   ZFORCE,STROKE,XACCEL
ADD TABLES=XYZB,21,GAP,9
LOCATION=56     VA          INPUTS=TL
LOCATION = 80     TA
LOCATION = 66     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 68     MA T     INPUTS=TA(D2=C1)
LOCATION = 63     TB
FORTRAN STATEMENTS
       IF (FO MA E .GT. 20.) FO MA E = 20.
       IF (FO MA E .LT. -20.) FO MA E = -20.
       IF (FO MA T .LT. 600.) FO MA T = 600.
       IF (FO MA T .GT. 3000.) FO MA T = 3000.
       IF (TSWITCH .LT. .1) FO MA T = 0.
       ELEOL = FO MA E
       TH TG = FO MA T
       SPOOL=A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
       IF (KOUNT .EQ. 1) WRITE(6,10) (RELTK(I),I=4,11),(DSMTK(I),I=4,27),
      1     (FTAFU2(I),I=4,11)
   10 FORMAT(8E13.5)
       RELTK(5)=RVCRP
       RELTK(6)=RVSATP
       RELTK(10)=RELTK(11)=RVAREA
       DSMTK(6)=DSMTK(9)=DSMTK(12)=FRONTMU
       DSMTK(18)=DSMTK(21)=DSMTK(24)=DSMTK(27)=REARMU
       DSMTK(15)=REARMU
       FTAFU2(5)=14.7+RVCRP
       FTAFU2(6)=14.7+RVSATP
       FTAFU2(10)=FTAFU2(11)=RVAREA
       P2 IO2 = P1 FR
LOCATION=37     IO2
LOCATION=43     FR     INPUTS=TK(PT=P,2),IO2(2=1)
FORTRAN STATEMENTS
       WTRTK=W2 FR*2.
LOCATION=24    TK    INPUTS=TL,FR(T,2=TTR)
LOCATION = 35     FU2     INPUTS=TK(PT=FIN)
FORTRAN STATEMENTS
       RELIEFA = FO FU2
       PRATIO=(PC TK-PA TK)/(PT TK-PA TK)
       CALL FNFLOW(PT TK,PA TK,T2 FR,CDATK*RELIEFA,1.,FN,WREL)
       WTRO=WTATK+WTCTK
       FX1S3 = 0
       FY1S3 = 0
       FZ1S3 = 0
       TX1S3 = 0
       TY1S3 = 0
       TZ1S3 = 0
       FY3S3=0
       TX3S3=0
       TZ3S3=0
LOCATION=6    S3
INPUTS=TK(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
```

```
INPUTS=OL(2=3)
FORTRAN STATEMENTS
      UD TL=FX4S3/AMASS-(Q  TL*W  TL)*.01745-
     1       32.2*SIN(PITTL*.01745)
      WD TL=FZ4S3/AMASS-(-Q  TL*U  TL)*.01745+
     1       32.2*COS(PITTL*.01745)*COS(ROLTL*.01745)
      ZFORCE = -WD TL/32.2
      STROKE = 45. - ALTTL*12.
LOCATION=10   TL    INPUTS=S3(TY,4=TY)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  TL*U  TL+W  TL*W  TL)
     1  +.5*(IYYTL*Q  TL*Q  TL)
      PENERGY= (PT TK-PA TK)*VT TK*144. + (PC TK-PA TK)*VC TK*144.
     1    + AMASS*32.2*ALTTL
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(QD TL*QD TL)
      LACCEL= (SQRT(UD TL*UD TL+WD TL*WD TL))/32.2
      VTOTAL=SQRT(U  TL*U  TL+W  TL*W  TL)
      XACCEL=EU VA*COS(PITTL) + EW VA*SIN(PITTL)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTTL*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V
      W1 TR=XYZB(3*I+3)
      ROLTR=0
      PITTR=PITTL
      YAWTR=0
LOCATION = 63     TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTTL*12.+W2 TR
      GAPLWF=GAP(4)
      GAPRWF=GAP(5)
      GAPLWR=GAP(6)
      GAPRWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTTL*12. -31.5
END OF MODEL
PRINT
```

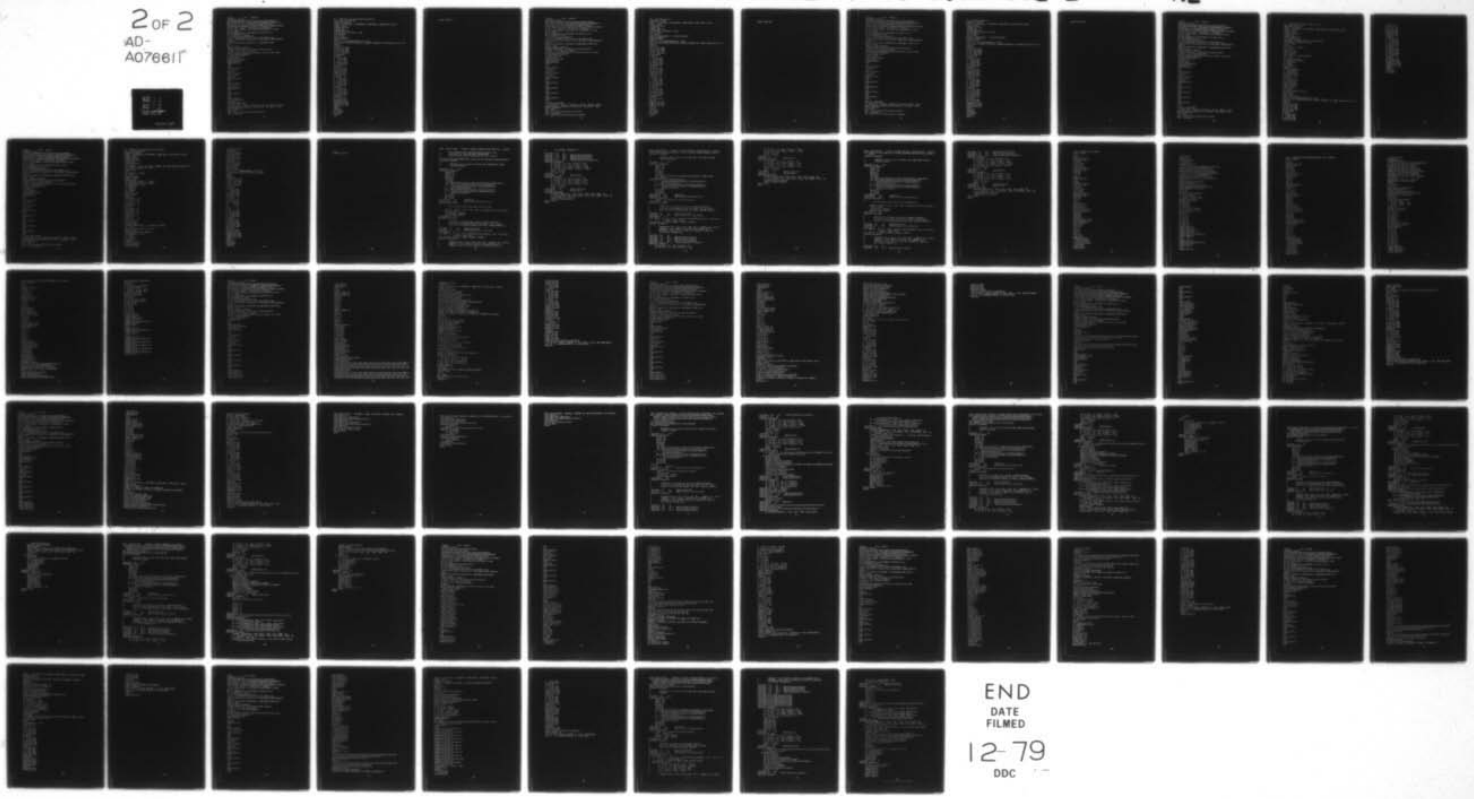
```
TITLE=           FILE   RFABD20
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=129.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=2860,IYYSG=2680,IZZSG=5120,IXZSG=0,IXYSG=0,IYZSG=0
X0 DL=-.032 ,XA DL= -1.203,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADDL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
Z0 DL=-.480
M0 DL=.0038,MALDL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,SPODL=0
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,X0 TG=0,Y0 TG=0,Z0 TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
ELEVATR=1.
TABLE,FTAFU,4
0,2140,25000,30000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
INITIAL CONDITIONS
U  SG=168.9,V  SG=0,W  SG=23.5,P  SG=0,Q  SG=0,R  SG=0,
ROLSG=0,PITSG=3,YAWSG=0,ALTSG=2000,X  SG=2141,Y  SG=0
PRINT CONTROL=4
O.C. DATA
YOP = 0,0,0,0,3,0,168.9,0,5,14.72,0,0
UOP = 0,0,650,0
```

```
Q = .0044,.01,.11,1,0,1,10,2,.5,1,10,10
RU = .01,.01,.02,.01
PARAMETER VALUES
XTRDL=-.00812,MALDL=-.114,MTRDL=-.00314,YTRDL=-.175,LTRDL=-.062,
NTRDL=-.038
PRINTER PLOTS
LINEAR ANALYSIS
DESIGN O.C.
LINEAR ANALYSIS
TITLE=R-ARPV W/ABSS DEPLOYED, LANDING APPROACH TRIM ANALYSIS
INT CONTROL, ALTSG=0,X  SG=0
STEADY STATE
XIC-X
INT CONTROL, ALTSG=1
O.C. DATA
YOP=C(9,1)0,0
UOP=C(3,1)600
STEADY STATE
INT CONTROL, ALTSG=0
O.C. DATA
YOP=C(9,1)5,14.72
PARAMETER VALUES, ELEVATR=0
SS PARAMETER=ELEOL
SS START=2
SS STOP=-12
SS POINTS=8
DISPLAY1
FO MA T,VS,ELEOL
U  SG,VS,ELEOL
W  SG,VS,ELEOL
FO MA1,VS,ELEOL
FO MA2,VS,ELEOL
DISPLAY2
VT VA,VS,ELEOL
AL VA,VS,ELEOL
PITSG,VS,ELEOL
FX2OL,VS,ELEOL
FZ2OL,VS,ELEOL
STEADY STATE
SS PARAMETER=NONE
PARAMETER VALUES, ELEVATR=1
INT CONTROL, ALTSG=1
O.C. DATA
YOP=C(7,1)135,0,0,0
STEADY STATE
INT CONTROL,ALTSG=0
O.C. DATA
YOP=C(9,1)3,7.065
STEADY STATE
PARAMETER VALUES, ELEVATR=0
SS PARAMETER=ELEOL
STEADY STATE
ALL STATES
PRINT CONTROL=3
PLOT ID = S.J.BAUMGARTNER, MS 41-47
TITLE=R-ARPV W/ABSS DEPLOYED, LANDING APPROACH W/ SHARP EDGED GUST AT T=5
PRATE=2
DISPLAY1
```

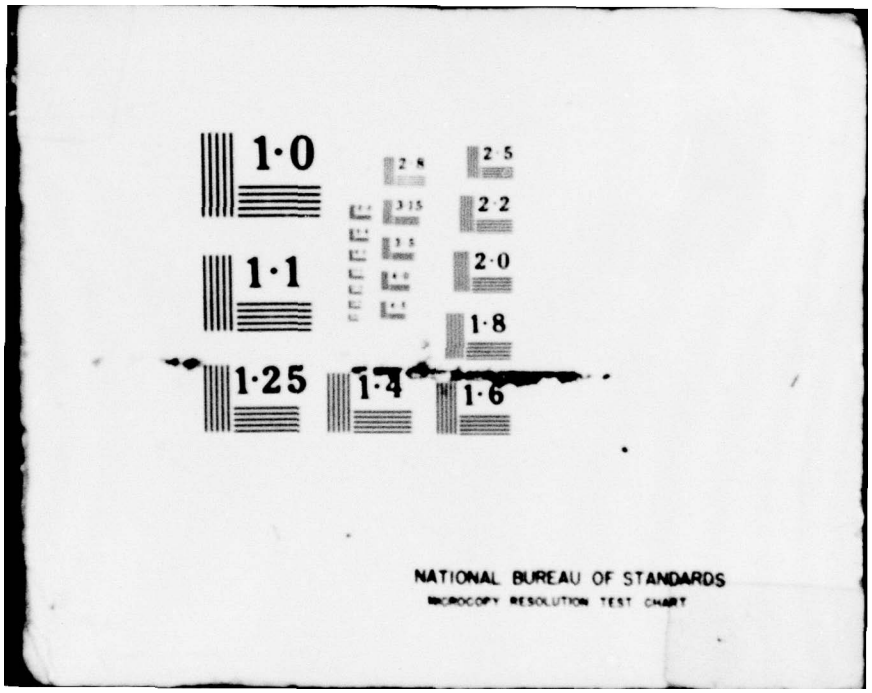
```
FO MA E,VS,TIME
FO MA R,VS,TIME
FO MA S,VS,TIME
FO MA T,VS,TIME
R24,VS,TIME
DISPLAY2
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
FO MA1,VS,TIME
VT VA,VS,TIME
DISPLAY3
AL VA,VS,TIME
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
ALTSG,VS,TIME
DISPLAY4
P  SG,VS,TIME
Q  SG,VS,TIME
R  SG,VS,TIME
BE VA,VS,TIME
X  SG,VS,TIME
DISPLAY5
Y  SG,VS,TIME
YD SG,VS,TIME
FO FU,VS,TIME
FO MA3,VS,TIME
UW VA,VS,TIME
DISPLAY6
VW VA,VS,TIME
WW VA,VS,TIME
KENERGY,VS,TIME
PENERGY,VS,TIME
TENERGY,VS,TIME
TINC=.1
TMAX=20.
OUTRATE=2
INT MODE=5
XIC-X
LINEAR ANALYSIS
```

AD-A076 611 BOEING AEROSPACE CO SEATTLE WA F/G 1/3
NEW REMOTELY PILOTED VEHICLE LAUNCH AND RECOVERY CONCEPTS - COM--ETC(U)
JUN 79 S J BAUMGARTNER , R F YURCZYK F33615-78-C-3404
UNCLASSIFIED AFFDL-TR-79-3069-VOL-2 NL

2 OF 2
AD-
A076611



END
DATE
FILMED
12-79
DDC


1·0
1·1
1·25
1·4
1·6
2·8
3·15
3·5
4·0
4·5
2·5
2·2
2·0
1·8
NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

```
TITLE=            FILE   RFATDT2
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MAIOL=129.4,C  OL=6.46,XPIOL=0,ISWOL=3,STAOL=0
IXXSG=2860,IYYSG=2680,IZZSG=5120,IXZSG=0,IXYSG=0,IYZSG=0
XO OL=-.032 ,XA OL= -1.203,XU OL= 0,XDEOL= 0
ZA OL=-4.011,ZADOL= 0,ZQ OL=0,ZU OL=0,ZDEOL=-1.146,
ZO OL=-.480
MO OL=.0038,MALOL=-.464,MADOL=-3.5,MQ OL=-6.,
MU OL=0,MDEOL=-1.748
B  DL=19.4,AILDL=0,SPOOL=0
YB DL=-.573,YBDOL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP
0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
IDIVA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
TABLE,FTAFU,4
0,2140,25000,30000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,5,5.5,6,50
0,0,-4,0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,5,5.1,5.9,6,50
1,1,0,0,1,1
INITIAL CONDITIONS
U  SG=168.9,V  SG=0,W  SG=23.5,P  SG=0,Q  SG=0,R  SG=0,
ROLSG=0,PITSG=3,YAWSG=0,ALTSG=2000,X  SG=2141,Y  SG=0
PRINT CONTROL=4
O.C. DATA
YOP = 0,0,0,0,3,0,168.9,0,5,14.72,0,0
UOP = 0,0,600,0
```

```
Q = .0044,.01,.11,1,0,1,10,2,.5,1,10,10
RU = .01,.001,.05,.01
PARAMETER VALUES
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0611,
NTRDL=-.0456
LINEAR ANALYSIS
DESIGN O.C.
LINEAR ANALYSIS
INT CONTROL, ALTSG=0,X  SG=0
STEADY STATE
ALL STATES
PRINT CONTROL=3
PRINTER PLOTS
PLOT ID = S.J.BAUMGARTNER, MS 41-47
TITLE=R-ARPV W/ACRS DEPLOYED, LANDING APPROACH W/ ELEVATOR KICK AT T=5
PRATE=2
DISPLAY1
FO MA E,VS,TIME
FO MA R,VS,TIME
FO MA S,VS,TIME
FO MA T,VS,TIME
R24,VS,TIME
DISPLAY2
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
FO MA1,VS,TIME
VT VA,VS,TIME
DISPLAY3
AL VA,VS,TIME
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
ALTSG,VS,TIME
DISPLAY4
P  SG,VS,TIME
Q  SG,VS,TIME
R  SG,VS,TIME
BE VA,VS,TIME
X  SG,VS,TIME
DISPLAY5
Y  SG,VS,TIME
YD SG,VS,TIME
FO FU,VS,TIME
FO MA3,VS,TIME
UW VA,VS,TIME
DISPLAY6
VW VA,VS,TIME
WW VA,VS,TIME
KENERGY,VS,TIME
PENERGY,VS,TIME
TENERGY,VS,TIME
TINC=.1
TMAX=20.
OUTRATE=2
INT MODE=5
SIMULATE
XIC-X
```

LINEAR ANALYSIS

```
TITLE=           FILE   RFATD1T
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=129.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=2860,IYYSG=2680,IZZSG=5120,IXZSG=0,IXYSG=0,IYZSG=0
XU DL=-.032 ,XA DL= -1.203,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADDL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
ZO DL=-.480
MO DL=.0038,MALDL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,SPODL=0
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
TABLE,FTAFU,4
0,2140,25000,30000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
INITIAL CONDITIONS
U  SG=168.9,V  SG=0,W  SG=23.5,P  SG=0,Q  SG=0,R  SG=0,
ROLSG=0,PITSG=3,YAWSG=0,ALTSG=2000,X  SG=2141,Y  SG=0
PRINT CONTROL=4
O.C. DATA
YOP = 0,0,0,0,3,0,168.9,0,5,14.72,0,0
UOP = 0,0,600,0
Q = .0044,.01,.11,1,0,1,10,2,.5,1,10,10
```

```
RU = .01,.001,.05,.01
PARAMETER VALUES
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTRDL=-.0456
LINEAR ANALYSIS
DESIGN O.C.
LINEAR ANALYSIS
INT CONTROL, ALTSG=0,X  SG=0
STEADY STATE
ALL STATES
INITIAL CONDITIONS, Y  SG=5,ALTSG=2010
PRINT CONTROL=3
PRINTER PLOTS
PLOT ID = S.J.BAUMGARTNER, MS 41-47
TITLE=R-ARPV W/ACRS DEPLOYED, LANDING APPROACH W/ SHARP EDGED GUST AT T=5
PRATE=2
DISPLAY1
FO MA E,VS,TIME
FO MA R,VS,TIME
FO MA S,VS,TIME
FO MA T,VS,TIME
R24,VS,TIME
DISPLAY2
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
FO MA1,VS,TIME
VT VA,VS,TIME
DISPLAY3
AL VA,VS,TIME
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
ALTSG,VS,TIME
DISPLAY4
P  SG,VS,TIME
Q  SG,VS,TIME
R  SG,VS,TIME
BE VA,VS,TIME
X  SG,VS,TIME
DISPLAY5
Y  SG,VS,TIME
YD SG,VS,TIME
FO FU,VS,TIME
FO MA3,VS,TIME
UW VA,VS,TIME
DISPLAY6
VW VA,VS,TIME
WW VA,V
KENERGY,VS,TIME
PENERGY,VS,TIME
TENERGY,VS,TIME
TINC=.1
TMAX=20.
OUTRATE=2
INT MODE=5
SIMULATE
XIC-X
```

LINEAR ANALYSIS

```
TITLE=          FILE   RFATD13
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=129.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=2860,IYYSG=2680,IZZSG=5120,IXZSG=0,IXYSG=0,IYZSG=0
XO DL=-.032 ,XA DL= -1.203,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADOL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
ZO DL=-.480
MO DL=.0038,MALDL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,SPODL=0
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
TABLE,FTAFU,4
0,2140,25000,30000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
INITIAL CONDITIONS
U  SG=168.9,V  SG=0,W  SG=23.5,P  SG=0,Q  SG=0,R  SG=0,
ROLSG=0,PITSG=3,YAWSG=0,ALTSG=2000,X  SG=2141,Y  SG=0
PRINT CONTROL=4
O.C. DATA
YOP = 0,0,0,0,3,0,168.9,0,5,14.72,0,0
UOP = 0,0,600,0
Q = .0044,.01,.11,1,0,1,10,2,.5,1,10,10
```

```
RU = .01,.001,.05,.01
PARAMETER VALUES
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTRDL=-.0456
LINEAR ANALYSIS
DESIGN D.C.
LINEAR ANALYSIS
INT CONTROL, ALTSG=0,X  SG=0
STEADY STATE
ALL STATES
INITIAL CONDITIONS, Y  SG=5,ALTSG=2010
PRINT CONTROL=3
PRINTER PLOTS
PLOT ID = S.J.BAUMGARTNER, MS 41-47
TITLE=R-ARPV W/ACRS DEPLOYED, LANDING APPROACH W/ SHARP EDGED GUST AT T=5
PRATE=2
DISPLAY1
FO MA E,VS,TIME
FO MA R,VS,TIME
FO MA S,VS,TIME
FO MA T,VS,TIME
R24,VS,TIME
DISPLAY2
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
FO MA1,VS,TIME
VT VA,VS,TIME
DISPLAY3
AL VA,VS,TIME
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
ALTSG,VS,TIME
DISPLAY4
P  SG,VS,TIME
Q  SG,VS,TIME
R  SG,VS,TIME
BE VA,VS,TIME
X  SG,VS,TIME
DISPLAY5
Y  SG,VS,TIME
YD SG,VS,TIME
FO FU,VS,TIME
FO MA3,VS,TIME
UW VA,VS,TIME
DISPLAY6
VW VA,VS,TIME
WW VA,VS,TIME
KENERGY,VS,TIME
PENERGY,VS,TIME
TENERGY,VS,TIME
TINC=.1
TMAX=20.
OUTRATE=2
INT MODE=5
SIMULATE
XIC-X
```

LINEAR ANALYSIS

```
TITLE=            FILE   RFATD20
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=129.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=2860,IYYSG=2680,IZZSG=5120,IXZSG=0,IXYSG=0,IYZSG=0
XO DL=-.032 ,XA DL= -1.203,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADDL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
ZO DL=-.480
MO DL=.0038,MALDL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,SPODL=0
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
ELEVATR=1.
TABLE,FTAFU,4
0,2140,25000,30000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
INITIAL CONDITIONS
U  SG=168.9,V  SG=0,W  SG=23.5,P  SG=0,Q  SG=0,R  SG=0,
ROLSG=0,PITSG=3,YAWSG=0,ALTSG=2000,X  SG=2141,Y  SG=0
PRINT CONTROL=4
O.C. DATA
YOP = 0,0,0,0,3,0,168.9,0,5,14.72,0,0
UOP = 0,0,650,0
```

```
Q = .0044,.01,.11,1,0,1,10,1,.5,1,1,1
RU = .01,.01,.02,.01
PARAMETER VALUES
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTRDL=-.0456
PRINTER PLOTS
LINEAR ANALYSIS
DESIGN O.C.
LINEAR ANALYSIS
TITLE=R-ARPV W/AC
DEPLOYED, LANDING APPROACH TRIM ANALYSIS
INT CONTROL, ALTSG=0,X  SG=0
STEADY STATE
XIC=X
INT CONTROL, ALTSG=1
O.C. DATA
YOP=C(9,1)0,0
UOP=C(3,1)600
STEADY STATE
INT CONTROL, ALTSG=0,PITSG=0
O.C. DATA
YOP=C(9,1)5,14.72
SS PARAMETER=PITSG,IC
SS START=1.5
SS STOP=9
SS POINTS=16
DISPLAY1
FO MA T,VS,PITSG
U  SG,VS,PITSG
W  SG,VS,PITSG
FO MA1,VS,PITSG
FO MA2,VS,PITSG
DISPLAY2
VT VA,VS,PITSG
AL VA,VS,PITSG
ELEOL,VS,PITSG
FX2OL,VS,PITSG
FZ2OL,VS,PITSG
STEADY STATE
O.C. DATA
YOP=C(7,1)135,0,3,7.065
STEADY STATE
ALL STATES
PRINT CONTROL=3
PLOT ID = S.J.BAUMGARTNER, MS 41-47
TITLE=R-ARPV W/ACRS DEPLOYED, LANDING APPROACH W/ SHARP EDGED GUST AT T=5
PRATE=2
DISPLAY1
FO MA E,VS,TIME
FO MA R,VS,TIME
FO MA S,VS,TIME
FO MA T,VS,TIME
R24,VS,TIME
DISPLAY2
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
FO MA1,VS,TIME
```

```
VT VA,VS,TIME
DISPLAY3
AL VA,VS,TIME
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
ALTSG,VS,TIME
DISPLAY4
P  SG,VS,TIME
Q  SG,VS,TIME
R  SG,VS,TIME
BE VA,VS,TIME
X  SG,VS,TIME
DISPLAY5
Y  SG,VS,TIME
YD SG,VS,TIME
FO FU,VS,TIME
FO MA3,VS,TIME
UW VA,VS,TIME
DISPLAY6
VW VA,VS,TIME
WW VA,VS,TIME
KENERGY,VS,TIME
PENERGY,VS,TIME
TENERGY,VS,TIME
TINC=.1
TMAX=20.
OUTRATE=2
INT MODE=5
```

```
TITLE=           FILE   RFATT1
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=228.6,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=6240,IYYSG=4840,IZZSG=10440,IXZSG=0,IXYSG=0,IYZSG=0
X0 DL=-.032 ,XA DL= -1.048,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADDL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
Z0 DL=-.370
M0 DL=.0038,MALDL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,SPODL=0
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=230,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,X0 TG=0,Y0 TG=0,Z0 TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU=1
ELEVATR=1.
TABLE,FTAFU,4
0,2000,3000,10000
10,10,60,410
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
INITIAL CONDITIONS
U  SG=230,V  SG=0,W  SG=36.02,P  SG=0,Q  SG=0,R  SG=0,
ROLSG=0,PITSG=9.9,YAWSG=0,ALTSG=20,X  SG=2200,Y  SG=0
PRINT CONTROL=4
O.C. DATA
YOP = 0,0,0,0,9.9,0,232.8,0,-1,-4.06,0,0
UOP = 0,-13.9,2675,0
```

```
Q = .0044,.01,.11,1,0,1,10,2,.5,1,10,10
RU = .01,.01,.02,.01
PARAMETER VALUES
XTROL=-.0176,MALOL=-.178,MTROL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTROL=-.0456
PRINTER PLOTS
LINEAR ANALYSIS
DESIGN O.C.
LINEAR ANALYSIS
ALL STATES
TITLE=R-ARPV W/ACTS DEPLOYED, TAKEOFF ROTATION AND TRIM ANALYSIS
INT CONTROL, ALTSG=1,X  SG=0
STEADY STATE
XIC-X
INT CONTROL, ALTSG=0
O.C. DATA
YOP=C(7,1)350
UOP=C(3,1)2700
STEADY STATE
INT CONTROL, ALTSG=1,U  SG=0
INITIAL CONDITIONS, X  SG=1900
SS PARAMETER=U  SG,IC
SS START=220
SS STOP=250
SS POINTS=7
O.C. DATA
YOP=C(9,1)0,0
UOP=C(2,1)0
DISPLAY1
FO MA T,VS,U  SG
ELEOL,VS,U  SG
W  SG,VS,U  SG
FO MA1,VS,U  SG
FO MA2,VS,U  SG
DISPLAY2
VT VA,VS,U  SG
AL VA,VS,U  SG
PITSG,VS,U  SG
FX2OL,VS,U  SG
FZZOL,VS,U  SG
DISPLAY3
UD OL,VS,U  SG
WD OL,VS,U  SG
STEADY STATE
SS PARAMETER=
INITIAL CONDITIONS, X  SG=2200,U  SG=230
O.C. DATA
YOP=C(5,1)9.9,0,350,0,-1,-4.06
STEADY STATE
PARAMETER VALUES, ELEVATR=0
SS PARAMETER = ELEOL
SS START=1
SS STOP=-8
SS POINTS=10
DISPLAY1
FO MA T,VS,ELEOL
W  SG,VS,ELEOL
FO MA1,VS,ELEOL
```

```
FO MA2,VS,ELEOL
DISPLAY2
VT VA,VS,ELEOL
AL VA,VS,ELEOL
PITSG,VS,ELEOL
FX2OL,VS,ELEOL
FZ2OL,VS,ELEOL
DISPLAY3
UD OL,VS,ELEOL
WD OL,VS,ELEOL
STEADY STATE
ALL STATES
PRINT CONTROL=3
PLOT ID = S.J.BAUMGARTNER, MS 41-47
TITLE=R-ARPV W/ACTS DEPLOYED, TAKEOFF
ALYSIS
PRATE=2
DISPLAY1
FO MA E,VS,TIME
FO MA R,VS,TIME
FO MA S,VS,TIME
FO MA T,VS,TIME
R24,VS,TIME
DISPLAY2
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
FO MA1,VS,TIME
VT VA,VS,TIME
DISPLAY3
AL VA,VS,TIME
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
ALTSG,VS,TIME
DISPLAY4
P  SG,VS,TIME
Q  SG,VS,TIME
R  SG,VS,TIME
BE VA,VS,TIME
X  SG,VS,TIME
DISPLAY5
Y  SG,VS,TIME
YD SG,VS,TIME
FO FU,VS,TIME
FO MA3,VS,TIME
UW VA,VS,TIME
DISPLAY6
VW VA,VS,TIME
WW VA,VS,TIME
KENERGY,VS,TIME
PENERGY,VS,TIME
TENERGY,VS,TIME
TINC=.1
TMAX=10.
OUTRATE=2
INT MODE=5
SIMULATE
```

```
MODEL DESCRIPTION    R-ARPV, LANDING APPROACH TRIM ANALYSIS,  RFMTD1T
C
C         THIS PROGRAM TESTS VARIOUS MODIFICATIONS TO THE
C         MATH MODEL OF THE AIRPLANES AERODYNAMICS
C         COMPARE THESE RESULTS WITH 8/17/78 -LBF  RESULTS
C
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2,KENERGY,PENERGY,TENERGY
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          LANDING APPROACH
C
LOCATION = 16      TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
       VW2 =UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2    +  WW*(SIN(RR)*COS(PP))
       WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
      1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
      2    +  WW*COS(RR)*COS(PP)
       UW VA=UW2
       VW VA=VW2
       WW VA=WW2
LOCATION=46     VA          INPUTS=SG
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
C
C         THE FOLLOWING FOUR LINES HAVE BEEN MODIFIED
C
       FINMA2 = SQRT(U  SG*U  SG+W  SG*W  SG)*SIN(FO MA1*3.14159/180.)
       RPD=.01745324
       CALVA=COS(AL VA*RPD)
       SALVA=SIN(AL VA*RPD)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C          GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59      FU       INPUTS=SG(X=FIN)
LOCATION = 67      MA3      INPUTS=SG(ALT=C2),FU(FO=FIN)
LOCATION=72     OC
O.C. INPUTS = P  SG,Q  SG,R  SG,ROLSG,PITSG,YAWSG,VT VA,V  SG,FO MA1,
              FO MA2,Y  SG,FO MA3
O.C. OUTPUTS = FINMA S,FINMA E,FINMA T,FINMA R
FORTRAN STATEMENTS
C
C          COMPONENTS MA E, MA S, MA T, AND  MA R  COMBINE O.C. OUTPUT
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
```

```
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 113     TA
LOCATION = 143     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 145     MA S    INPUTS=TA(B2=C2,D2=C1)
LOCATION = 147     MA R    INPUTS=TA(C2=C2,D2=C1)
LOCATION = 149     MA T     INPUTS=TA2(D2=C2),TA(D2=C1)
FORTRAN STATEMENTS
      IF (FO MA E .GT. 20.) FO MA E = 20.
      IF (FO MA E .LT. -20.) FO MA E = -20.
      IF (FO MA T .LT. 600.) FO MA T = 600.
      IF (FO MA T .GT. 3000.) FO MA T = 3000.
      ELEOL = FO MA E
      TH TG = FO MA T
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (FO MA S .GT. 45.) FO MA S = 45.
      IF (FO MA S .LT. -45.) FO MA S = -45.
      IF (FO MA R .GT. 15.) FO MA R = 15.
      IF (FO MA R .LT. -15.) FO MA R = -15.
      FSPDL = FO MA S
      RUDDL = FO MA R
LOCATION=34     DL          INPUTS=VA,OL,TG
LOCATION=10     SG          INPUTS=DL,OL
FORTRAN STATEMENTS
      KENERGY=.5*MA1OL*(U  SG*U  SG*V  SG*V  SG*W  SG*W  SG)
     1  +.5*(IXXSG*P  SG*P  SG+IYYSG*Q  SG*Q  SG+IZZSG*R  SG*R  SG)
      PENERGY=MA1OL*32.2*ALTSG
      TENERGY=KENERGY+PENERGY
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION    R-ARPV, LANDING APPROACH TRIM ANALYSIS,  RFMTD11
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2,KENERGY,PENERGY,TENERGY
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          LANDING APPROACH
C
LOCATION = 16      TA2
FORTRAN STATEMENTS
      UW=A2 TA2
      VW=B2 TA2
      WW=C2 TA2
      RR=ROLSG
      PP=PITSG
      YY=YAWSG
      UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
      VW2 =UW*(SI
R)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
     1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
     2    +  WW*(SIN(RR)*COS(PP))
      WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
     1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
     2    +  WW*COS(RR)*COS(PP)
      UW VA=UW2
      VW VA=VW2
      WW VA=WW2
LOCATION=46    VA          INPUTS=SG
LOCATION=28    MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
      FINMA2 = VT VA*SIN(FO MA1*3.14159/180.)
LOCATION=64    MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C          GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59      FU      INPUTS=SG(X=FIN)
LOCATION = 67      MA3     INPUTS=SG(ALT=C2),FU(FO=FIN)
LOCATION=72    OC
O.C. INPUTS = P  SG,Q  SG,R  SG,ROLSG,PITSG,YAWSG,VT VA,V  SG,FO MA1,
              FO MA2,Y  SG,FO MA3
O.C. OUTPUTS = FINMA S,FINMA E,FINMA T,FINMA R
FORTRAN STATEMENTS
C
C          COMPONENTS MA E, MA S, MA T, AND  MA R  COMBINE O.C. OUTPUT
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 113     TA
LOCATION = 143     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 145     MA S    INPUTS=TA(B2=C2,D2=C1)
LOCATION = 147     MA R    INPUTS=TA(C2=C2,D2=C1)
LOCATION = 149     MA T     INPUTS=TA2(D2=C2),TA(D2=C1)
FORTRAN STATEMENTS
      IF (FO MA E .GT. 20.) FO MA E = 20.
      IF (FO MA E .LT. -20.) FO MA E = -20.
```

```
      IF (FO MA T .LT. 600.) FO MA T = 600.
      IF (FO MA T .GT. 3000.) FO MA T = 3000.
      ELEDL = FO MA E
      TH TG = FO MA T
LOCATION = 51     TG
LOCATION=2      DL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (FO MA S .GT. 45.) FO MA S = 45.
      IF (FO MA S .LT. -45.) FO MA S = -45.
      IF (FO MA R .GT. 15.) FO MA R = 15.
      IF (FO MA R .LT. -15.) FO MA R = -15.
      FSPDL = FO MA S
      RUDDL = FO MA R
LOCATION=34     DL          INPUTS=VA,DL,TG
LOCATION=10     SG          INPUTS=DL,DL
FORTRAN STATEMENTS
      KENERGY=.5*MA1DL*(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
     1  +.5*(IXXSG*P  SG*P  SG+IYYSG*Q  SG*Q  SG+IZZSG*R  SG*R  SG)
      PENERGY=MA1DL*32.2*ALTSG
      TENERGY=KENERGY+PENERGY
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION    R-ARPV, LANDING APPROACH TRIM ANALYSIS,  RFMTD20
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2,KENERGY,PENERGY,TENERGY,
   ELEVATR
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          LANDING APPROACH
C
LOCATION = 16      TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
       VW2 =UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2    +  WW*(SIN(RR)*COS(PP))
       WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
      1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
      2    +  WW*COS(RR)*COS(PP)
       UW VA=UW2
       VW VA=VW2
       WW VA=WW2
LOCATION=46     VA          INPUTS=SG
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
C
C          THE FOLLOWING FOUR LINES HAVE BEEN MODIFIED
C
       FINMA2 = SQRT(U  SG*U  SG+W  SG*W  SG)*SIN(FO MA1*3.14159/180.)
       RPD=.01745324
       CALVA=COS(AL VA*RPD)
       SALVA=SIN(AL VA*RPD)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C          GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59      FU       INPUTS=SG(X=FIN)
LOCATION = 67      MA3      INPUTS=SG(ALT=C2),FU(FO=FIN)
LOCATION=72     OC
O.C. INPUTS = P  SG,Q  SG,R  SG,ROLSG,PITSG,YAWSG,VT VA,V  SG,FO MA1,
              FO MA2,Y  SG,FO MA3
O.C. OUTPUTS = FINMA S,FINMA E,FINMA T,FINMA R
FORTRAN STATEMENTS
C
C          COMPONENTS MA E, MA S, MA T, AND  MA R  COMBINE O.C. OUTPUT
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 113     TA
LOCATION = 143     MA E     INPUTS=TA(A2=C2,D2=C1)
```

```
LOCATION = 145     MA S    INPUTS=TA(B2=C2,D2=C1)
LOCATION = 147     MA R    INPUTS=TA(C2=C2,D2=C1)
LOCATION = 149     MA T     INPUTS=TA2(D2=C2),TA(D2=C1)
FORTRAN STATEMENTS
      IF (FO MA E .GT. 20.) FO MA E = 20.
      IF (FO MA E .LT. -20.) FO MA E = -20.
      IF (FO MA T .LT. 600.) FO MA T = 600.
      IF (FO MA T .GT. 2700.) FO MA T = 2700.
      IF (ELEVATR .GT. 0.1) ELEOL = FO MA E
      TH TG = FO MA T
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (FO MA S .GT. 45.) FO MA S = 45.
      IF (FO MA S .LT. -45.) FO MA S = -45.
      IF (FO MA R .GT. 15.) FO MA R = 15.
      IF (FO MA R .LT. -15.) FO MA R = -15.
      FSPOL = FO MA S
      RUDOL = FO MA R
LOCATION=34     OL          INPUTS=VA,OL,TG
LOCATION=10     SG          INPUTS=DL,OL
FORTRAN STATEMENTS
      KENERGY=.5*MA1OL*(U  SG*U  SG*V  SG*V  SG*W  SG*W  SG)
     1  +.5*(IXXSG*P  SG*P  SG*IYYSG*Q  SG*Q  SG*IZZSG*R  SG*R  SG)
      PENERGY=MA1OL*32.2*ALTSG
      TENERGY=KENERGY+PENERGY
END OF MODEL
PRINT
```

```
TITLE= LAUNCH FILE RLAAS01
TABLE,TPOI01,2
0,.1
0,4000
TABLE,PR FR1,2,3
475,513.1,550
474,758
1.145,1.015
1.15,1.02
1.155,1.025
TABLE,ET FR1,2,3
475,513.1,550
474,758
.79,.59
.8,.6
.81,.61
TABLE,TPOI02,2
0,.1
0,2000
TABLE,PR FR2,2,3
475,513.1,550
237,379
1.145,1.015
1.15,1.02
1.155,1.025
TABLE,ET FR2,2,3
475,513.1,550
237,379
.79,.59
.8,.6
.81,.61
TABLE,ABLTK,2
22,0,69.1,1
TABLE,XYZTK,16
85.39,3.06,0,67.5
81.06,7.39,0,22.5
75,8,0,0
65,8,0,0
51,8,0,0
37,8,0,0
26.94,7.39,0,-22.5
22.61,3.06,0,-67.5
TABLE,DSMTK,12
19.2,1,.7
19.2,1,.7
6,1,.7
14,1,.7
14,1,.7
14,1,.7
19.2,1,.7
19.2,1,.7
TABLE,IALTK,16
1,.0122,29.55,10
1,.0122,29.55,10
1,.00515,29.55,10
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
```

```
1,0,34.55,0
1,0,34.55,0
TABLE,RELTK,4
0,1.73,2.8,100
0,0,144,144
PARAMETER VALUES
P1 IO1=14.7,T1 IO1=520,SH1IO1=0,CO1IO1=0
EN FR1=11.7,UA FR1=1,TAMFR1=520
OPEDV1=.25,AL DV1=.25,D  DV1=13.79
TAMDV1=520,HO DV1=1,FC DV1=1,VALDV1=2
P1 IO2=14.7,T1 IO2=520,SH1IO2=0,CO1IO2=0
EN FR2=11.7,UA FR2=1,TAMFR2=520
OPEDV2=.20,AL DV2=.25,D  DV2=9.75
TAMDV2=520,HO DV2=1,FC DV2=1,VALDV2=2
NE TK=-8
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=208,WLTTK=43
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=168.6,WLCTK=67.5,TAUTK=.005
AMOTK=0,DMPTK=.02,EPCTK=1
PA TK=14.7
VU TK=60
ROLTK=0,PITTK=0,YAWTK=0
X  TK=0,ALTTK=10
P  TK=0,Q  TK=0,R  TK=0
U  TK=0,V  TK=0,W  TK=0
INITIAL CONDITIONS
P1 FR1=14.2
P1 DV1=16.
P1 FR2=14.2
P1 DV2=15.5
PT TK=15.93,VT TK=93.4
PC TK=14.7,VC TK=46.1
ERROR CONTROLS
PT TK=.01
VT TK=.01
PC TK=.01
VC TK=.01
P1 FR1=.01
P1 DV1=.01
P1 FR2=.01
P1 DV2=.01
PRINT CONTROL=3
LINEAR ANALYSIS
STEADY STATE,XIC-X
LINEAR ANALYSIS
PARAMETER VALUES,OPEDV2=.3
LINEAR ANALYSIS
STEADY STATE
XIC-X
LINEAR ANALYSIS
PARAMETER VALUES,OPEDV2=.4
LINEAR ANALYSIS
STEADY STATE
XIC-X
LINEAR ANALYSIS
```

```
TITLE= LANDING WITH SUCTION BRAKING, FILE RLAAS06
TABLE,TPOI01,2
0,1
0,20000
TABLE,PR FR1,2,3
400,500,600
100,600
1.18,1.113
1.2,1.133
1.22,1.153
TABLE,ET FR1,2,3
400,500,600
100,600
.83,.78
.85,.8
.87,.82
TABLE,PR FR2,2,3
400,500,600
50,300
1.18,1.113
1.2,1.133
1.22,1.153
TABLE,ET FR2,2,3
400,500,600
50,300
.83,.78
.85,.8
.87,.82
TABLE,ABLTK,2
22.0,69.1,1
TABLE,XYZTK,16
85.39,3.06,0,67.5
81.06,7.39,0,22.5
75,8,0,0
65,8,0,0
51,8,0,0
37,8,0,0
26.94,7.39,0,-22.5
22.61,3.06,0,-67.5
TABLE,DSMTK,12
19.2,1,.7
19.2,1,.7
6,1,.7
14,1,.7
14,1,.7
14,1,.7
19.2,1,.7
19.2,1,.7
TABLE,IALTK,16
1,.0122,29.55,10
1,.0122,29.55,10
1,.00515,29.55,10
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
TABLE,RELTK,4
```

```
0,1.73,2.8,100
0,0,144,144
PARAMETER VALUES
P1 IO1=14.7,T1 IO1=520,SH1IO1=0,CO1IO1=0
AK DU1=1.5,AL DU1=1,D  DU1=13.79
TAMDU1=520,HO DU1=1,FC DU1=1
EN FR1=11.7,UA FR1=1,TAMFR1=520
OPEDV1=60,AL DV1=.25,D  DV1=13.79
TAMDV1=520,HO DV1=1,FC DV1=1,VALDV1=1
EN FR2=11.7,UA FR2=1,TAMFR2=520
OPEDV2=60,AL DV2=.25,D  DV2=9.75
TAMDV2=520,HO DV2=1,FC DV2=1,VALDV2=1
T1 DV2=520
OPEDV3=60,AL DV3=.5,D  DV3=9.75
TAMDV3=520,HO DV3=1,FC DV3=
ALDV3=1
P2 DV3=14.7
NE TK=-8
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=208,WLTTK=43
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=168.6,WLCTK=67.5,TAUTK=.005
AMOTK=0,DMPTK=.02,EPCTK=1
PA TK=14.7
VU TK=60
ROLTK=0,PITTK=0,YAWTK=0
X  TK=0,ALTTK=10
P  TK=0,Q  TK=0,R  TK=0
U  TK=0,V  TK=0,W  TK=0
TCUTK=520
GAILA=-1,TC LA=.01
INITIAL CONDITIONS
FO LA=-50
P1 DU1=14.3
P1 FR1=14.2
P1 DV1=16.
P1 DV3=16
P1 FR2=14.2
P1 DV2=14.7
PT TK=15.93,VT TK=93.4
PC TK=14.7,VC TK=98
ERROR CONTROLS
FO LA=.01
PT TK=.01
VT TK=.01
PC TK=.01
VC TK=.01
P1 DU1=.01
P1 FR1=.01
P1 DV1=.01
P1 DV3=.01
P1 FR2=.01
P1 DV2=.01
PRINT CONTROL=3
LINEAR ANALYSIS
STEADY STATE,XIC-X
LINEAR ANALYSIS
```

```
TITLE= LANDING W-O SUCTION BRAKING, FILE RLAAS07
TABLE,TPOI01,2
0,.1
0,4000
TABLE,PR FR1,2,3
475,513.1,550
474,758
1.145,1.015
1.15,1.02
1.155,1.025
TABLE,ET FR1,2,3
475,513.1,550
474,758
.79,.59
.8,.6
.81,.61
TABLE,ABLTK,2
22,0,69.1,1
TABLE,XYZTK,16
85.39,3.06,0,67.5
81.06,7.39,0,22.5
75.8,0,0
65.8,0,0
51.8,0,0
37.8,0,0
26.94,7.39,0,-22.5
22.61,3.06,0,-67.5
TABLE,DSMTK,12
19.2,1,.7
19.2,1,.7
6,1,.7
14,1,.7
14,1,.7
14,1,.7
19.2,1,.7
19.2,1,.7
TABLE,IALTK,16
1,.0122,29.55,10
1,.0122,29.55,10
1,.00515,29.55,10
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
TABLE,RELTK,4
0,1.73,2.8,100
0,0,144,144
PARAMETER VALUES
P1 I01=14.7,T1 I01=520,SH1I01=0,CO1I01=0
EN FR1=11.7,UA FR1=1,TAMFR1=520
OPEDV1=.25,AL DV1=.25,D  DV1=13.79
TAMDV1=520,HO DV1=1,FC DV1=1,VALDV1=2
NE TK=-8
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=208,WLTTK=43
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=168.6,WLCTK=67.5,TAUTK=.005
```

```
AMOTK=0,DMPTK=.02,EPCTK=1
PA TK=14.7
VU TK=60
ROLTK=0,PITTK=0,YAWTK=0
X  TK=0,ALTTK=10
P  TK=0,Q  TK=0,R  TK=0
U  TK=0,V  TK=0,W  TK=0
WCUTK=0,TCUTK=520
INITIAL CONDITIONS
P1 FR1=14.2
P1 DV1=16.
PT TK=15.93,VT TK=93.4
PC TK=14.7,VC TK=46.1
ERROR CONTROLS
PT TK=.01
VT TK=.01
PC TK=.01
VC TK=.01
P1 FR1=.01
P1 DV1=.01
PRINT CONTROL=3
LINEAR ANALYSIS
STEADY STATE,XIC-X
LINEAR ANALYSIS
PARAMETER VALUES,OPEDV1=.4
LINEAR ANALYSIS
STEADY STATE
XIC-X
LINEAR ANALYSIS
PARAMETER VALUES,OPEDV1=.5
LINEAR ANALYSIS
STEADY STATE
XIC-X
LINEAR ANALYSIS
PARAMETER VALUES,OPEDV1=.3
STEADY STATE
PARAMETER VALUES,OPEDV1=.2
STEADY STATE
PARAMETER VALUES,OPEDV1=.6
STEADY STATE
PARAMETER VALUES,OPEDV1=.15
STEADY STATE
PARAMETER VALUES,OPEDV1=.1
STEADY STATE
```

```
TITLE=            FILE  RLABA1
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=129.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=2860,IYYSG=2680,IZZSG=5120,IXZSG=0,IXYSG=0,IYZSG=0
XO DL=-.032 ,XA DL= -1.203,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADDL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
ZO DL=-.480
MO DL=.0038,MALDL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,ZSPDL=.25
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU2=1
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,2140,25000,30000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
```

```
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLAB, 3
21,7,47.6,30,150
TABLE, XYZAB, 12
150,9,0
130,9,0
110,9,0
90,9,0
70,9,0
50,9,0
30,9,0
10,9,0
TABLE, DSMAB, 12
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
20,1,.7
TABLE, IALAB, 16
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
1,0,17.8,0
TABLE, RELAB, 4
0,1.1,2.1,100
0,0,144,144
TABLE,FTAFU2,4
0,15.8,16.8,1000
0,0,144,144
TABLE,FTAFU3,4
0,15.8,16.8,1000
0,0,144,144
TABLE,ET AS,5
0,.05,.1,.15,.2
0,22446,50443,85272,123210
TABLE,TABEJ1,15,3
1.34,2.02,3.38
0,1.0,1.02,1.027,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,1.388,10
100,4.06,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
28.3,3.63,3.136,2.86,1.915,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
9.9,2.94,2.77,2.71,2.526,2.42,2.334,1.816,1.01,.432,-.01,-.01,-.01,-.01,-.01
TABLE,TABEJ2,15,3
1.34,2.02,3.38
0,1.0,1.02,1.027,1.051,1.06,1.068,1.105,1.14,1.163,1.184,1.245,1.28,1.388,10
100,4.06,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
28.3,3.63,3.136,2.86,1.915,1.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01,-.01
9.9,2.94,2.77,2.71,2.526,2.42,2.334,1.816,1.01,.432,-.01,-.01,-.01,-.01,-.01
```

```
PARAMETER VALUES
TSWITCH=1.
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTRDL=-.0456
PARAMETER VALUES
W1 EJ1=18.42,T1 EJ1=560
P2 EJ1=14.7,T2 EJ1=520
ANTEJ1=.354,ANEEJ1=.354,AK EJ1=0
W1 EJ2=18.42,T1 EJ2=560
P2 EJ2=14.7,T2 EJ2=520
ANTEJ2=.354,ANEEJ2=.354,AK EJ2=0
BSCAS=168.6,WLCAS=107.5,BSHAS=254,WLHAS=89
LH AS=48,YS AS=100,YM AS=10
HC AS=.5,EC AS=1.3E7,DNCAS=.283
AC AS=.2,ICSAS=2500,DNTAS=.03
THKAS=.1,WDTAS=5,TPDAS=200
RO AS=12,IDRAS=30000,DMPAS=1.,VO AS=135
FINMA S=0,FINMA E=0,FINMA T=0,FINMA R=0
REARMU=.7,FRONTMU=.7,RVCRP=1.1,RVSATP=2.1,RVAREA=144.,KOUNT=1
AN FU=1
AN FU3=1
AMASS=129.5
PA AB=14.7,VU AB=6,EPCAB=1
NE AB=8,NSTAB=1,NPTAB=10
BSTAB=236.6,WLTAB=76
CD1AB=.6,CDAAB=.9
BSCAB=168.6,WLCAB=107.5
TAUAB=.005,AMOAB=0
ANRAB=0,DL AB=0,H  AB=0
DMPAB=.02,CD2AB=.2
INITIAL CONDITIONS
P1 EJ1=29.7,P1 EJ2=29.7
G1RAS=0,G2RAS=0,G1LAS=0,G2LAS=0
PTRAB=15.7,VTRAB=30
PTLAB=15.7,VTLAB=30
U  SG=134.6,V  SG=.5,W  SG=11.06
P  SG=0,Q  SG=0,R  SG=0
ROLSG=2,PITSG=3,YAWSG=0
X  SG=50.,Y  SG=0,ALTSG=5.1
ERROR CONTROLS
P1 EJ1=.01,P1 EJ2=.01
G1RAS=.01,G2RAS=.01,G1LAS=.01,G2LAS=.01
PTRAB=.01,VTRAB=.01
PTLAB=.01,VTLAB=.01
U  SG=.01,V  SG=.01,W  SG=.01
P  SG=.01,Q  SG=.01,R  SG=.01
ROLSG=.01,PITSG=.01,YAWSG=.01
X  SG=.01,Y  SG=.01,ALTSG=.01
PRINT CONTROL=3
LINEAR ANALYSIS
NO STATES
INT CONTROL,PTRAB=1,VTRAB=1,PTLAB=1,VTLAB=1
STEADY STATE
XIC-X
ALL STATES
INT CONTROL, P1 EJ1=0,P1 EJ2=0
PRINTER PLOTS
DISPLAY1
```

```
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
X  SG,VS,TIME
Y  SG,VS,TIME
DISPLAY2
ALTSG,VS,TIME
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
P  SG,VS,TIME
DISPLAY3
Q  SG,VS,TIME
R  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY4
PTRAB,VS,TIME
VTRAB,VS,TIME
PTLAB,VS,TIME
VTLAB,VS,TIME
RELIEFR,VS,TIME
DISPLAY5
Y  SG,VS,X  SG
R22,VS,TIME
GAPLWF,VS,TIME
GAPLWR,VS,TIME
GAPRWF,VS,TIME
DISPLAY6
GAPRWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
GAPCG,VS,TIME
ZFORCE,VS,TIME
TINC=.02,TMAX=3,PRATE=1,INT MODE=5
TITLE=R-ARPV W/ABSS, LANDING W/ FULL AERO., 6 DOF, AND ARRESTMENT
PLOT ID = S.J.BAUMGARTNER,MS 41-47,655-5260
SIMULATE
```

```
TITLE=           FILE  RLACA2
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=129.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=2860,IYYSG=2680,IZZSG=5120,IXZSG=0,IXYSG=0,IYZSG=0
XO DL=-.032 ,XA DL= -1.203,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADOL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
ZO DL=-.480
MO DL=.0038,MALDL=-.464,MADOL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,ZSPDL=.25
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU2=1
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,2140,25000,30000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
```

```
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLTK, 2
22,0,69.1,1
TABLE, XYZTK, 16
85.39,3.06,0,67.5
81.06,7.39,0,22.5
75,8,0,0
65,8,0,0
51,8,0,0
37,8,0,0
26.94,7.39,0,-22.5
22.61,3.06,0,-67.5
TABLE, DSMTK, 12
19.2,1,.2
19.2,1,.2
6,1,.2
14,1,.7
14,1,.7
14,1,.7
19.2,1,.7
19.2,1,.7
TABLE, IALTK, 16
1,.0122,29.55,10
1,.0122,29.55,10
1,.00515,29.55,10
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
TABLE, RELTK, 4
0,2,4,100
0,0,144,144
TABLE,FTAFU2,4
0,16.7,18.7,1000
0,0,144,144
TABLE,ET AS,5
0,.05,.1,.15,.2
0,22446,50443,85272,123210
PARAMETER VALUES
TSWITCH=0.
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTRDL=-.0456
PARAMETER VALUES
BSCAS=168.6,WLCAS=100,BSMAS=254,WLMAS=89
LH AS=44,YS AS=100,YM AS=10
HC AS=.5,EC AS=1.3E7,DNCAS=.283
AC AS=.2,ICSAS=2500,DNTAS=.03
THKAS=.1,WDTAS=5,TPOAS=300
RO AS=12,IDRAS=30000,DMPAS=1.5,VO AS=135
FINMA S=0,FINMA E=0,FINMA T=0,FINMA R=0
REARMU=.7,FRONTMU=.2,RVCRP=2.,RVSATP=4.,RVAREA=144.,KOUNT=1
AN FU=1
AMASS=129.5
```

```
ANRTK=0,DL TK=0,H  TK=0
PA TK=14.7,WCUTK=0,TCUTK=520
WTRTK=50,TTRTK=520,NE TK=8
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=216.6,WLTTK=83
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=168.6,WLCTK=100,TAUTK=.005,VU TK=60.
AMOTK=0,DMPTK=.02,EPCTK=1
IXXSG=2680,IYYSG=2860,IZZSG=5120
IXZSG=0,IXYSG=0,IYZSG=0
INITIAL CONDITIONS
G1RAS=0,G2RAS=0,G1LAS=0,G2LAS=0
PT TK=15.93,VT TK=93.9
PC TK=14.7,VC TK=46.1
U  SG=144.67,V  SG=-3.95,W  SG=41.45
P  SG=3.39,Q  SG=1.27,R  SG=0
ROLSG=4.82,PITSG=12.54,YAWSG=2.83
X  SG=6.5,Y  SG=6.78,ALTSG=3.75
PRINT CONTROL=3
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TK=1,VT TK=1,PC TK=1,VC TK=1
STEADY STATE
XIC-X
ALL STATES
PRINTER PLOTS
DISPLAY1
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
X  SG,VS,TIME
Y  SG,VS,TIME
DISPLAY2
ALTSG,VS,TIME
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
P  SG,VS,TIME
DISPLAY3
Q  SG,VS,TIME
R  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY4
PT TK,VS,TIME
VT TK,VS,TIME
PC TK,VS,TIME
VC TK,VS,TIME
RELIEFA,VS,TIME
DISPLAY5
PRATIO,VS,TIME
R20,VS,TIME
GAPLWF,VS,TIME
GAPLWR,VS,TIME
GAPRWF,VS,TIME
DISPLAY6
GAPRWR,VS,TIME
```

```
GAPFF,VS,TIME
GAPFR,VS,TIME
GAPCG,VS,TIME
TENERGY,VS,TIME
TINC=.02,TMAX=3,PRATE=1,INT MODE=5
TITLE=R-ARPV W/ACRS, LANDING W/ FULL AERO., 6 DOF, AND ARRESTMENT
PLOT ID = S.J.BAUMGARTNER,MS 41-47,655-5260
SIMULATE
```

```
TITLE=            FILE  RLACE2
PARAMETER VALUES
P1 IO2=14.7,T1 IO2=520,SH1IO2=0,CO1IO2=0
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1OL=129.4,C  OL=6.46,XP1OL=0,ISWOL=3,STAOL=0
IXXSG=2860,IYYSG=2680,IZZSG=5120,IXZSG=0,IXYSG=0,IYZSG=0
XO OL=-.032 ,XA OL= -1.203,XU OL= 0,XDEOL= 0
ZA OL=-4.011,ZADOL= 0,ZQ OL=0,ZU OL=0,ZDEOL=-1.146,
ZO OL=-.480
MO OL=.0038,MALOL=-.464,MADOL=-3.5,MQ OL=-6.,
MU OL=0,MDEOL=-1.748
B  OL=19.4,AILOL=0,ZSPOL=.25
YB OL=-.573,YBDOL=0,YP OL=0,YR OL=0,YDROL=.212
LDROL=-.084,LB OL=-.264,LP OL=-.310,LFSOL=.0138,LBDOL=0,
LR OL=0
NDROL=-.344,NFSOL=.00525,NB OL=.086,NBDOL=0,NP OL=0,
NR OL=-.140
LBROL=1,YBROL=1,NBROL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU2=1
TABLE,TPOIO2,2
0,1
0,10000
TABLE,PR FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892,1086,1396
1.4,1.16,1.159,1.158,1.157,1.154,1.14,1.09,1,1,1
1.4,1.09,1.08,1.07,1.027,1,1,1,1,1,1
TABLE,ET FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,692,1086,1396
.01,.15,.35,.6,.76,.8,.8,.6,.01,.01,.01
.01,.05,.6,.7,.4,.01,.01,.01,.01,.01,.01
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,2140,25000,30000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
```

```
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE,ABLTS,9
21,7,24,.05,.01,.3
21,7,24,.05,.01,.3
21,7,24,.05,.01,.3
TABLE,XYZTS,16
138.41,3.44,0,67.5
133.54,8.31,0,22.5
118.45,9,0,0
94,9,0,0
68.4,9,0,0
42.8,9,0,0
26.56,8.31,0,-22.5
21.69,3.44,0,-67.5
TABLE,DM TS,8
45,.2
45,.2
23.2,.2
25.6,.7
25.6,.7
25.6,.7
45,.7
45,.7
TABLE,IALTS,16
1,.0282,11,4
2,.0282,11,4
3,.0282,11,4
3,0,0,0
3,0,0,0
3,0,0,0
2,0,0,0
1,0,0,0
TABLE,RELTS,4
0,1.8,3.8,100
0,0,144,144
TABLE,ENDTS,2
9,0
9,0
TABLE,SPHTS,3,3
1,2,3
```

```
0,5,25
0,1.58,1.6
0,1.58,1.6
0,.8,2
TABLE,STHTS,2,3
1,2,3
0,27
0,1
0,1
0,1
TABLE,BWTTS,4
238.6,69,168.6,107.5
0,0,0,0
TABLE,FTAFU2,4
0,16.5,18.5,1000
0,0,144,144
TABLE,ET AS,5
0,.05,.1,.15,.2
0,22446,50443,85272,123210
PARAMETER VALUES
EN FR=7,UA FR=1,TAMFR=520
TSWITCH=0.
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTRDL=-.0456
PARAMETER VALUES
BSCAS=168.6,WLCAS=107.5,BSMAS=264,WLMAS=86
LH AS=64,YS AS=100,YM AS=10
MC AS=.5,EC AS=1.3E7,DNCAS=.283
AC AS=.2,ICSAS=2500,DNTAS=.03
THKAS=.1,WDTAS=5,TPOAS=300
RO AS=12,IDRAS=30000,DMPAS=1.5,VO AS=135
FINMA S=0,FINMA E=0,FINMA T=0,FINMA R=0
REARMU=.7,FRONTMU=.2,RVCRP=1.8,RVSATP=3.8,RVAREA=144.,KOUNT=1
AN FU=1
AMASS=129.5
IXXSG=2680,IYYSG=2860,IZZSG=5120
IXZSG=0,IXYSG=0,IYZSG=0
ANETS=-8,PA TS=14.7
PTMTS=2,CAVTS=0,SPBTS=0
CDGTS=.9
WCUTS=0,TCUTS=520
CD1TS=.6,CD2TS=.2,CDATS=.9
TAUTS=.1,VU TS=6
DMPTS=.02,EPCTS=1
INITIAL CONDITIONS
G1RAS=0,G2RAS=0,G1LAS=0,G2LAS=0
P1 FR=14.4
PT TS=16.2,VT TS=97
PC TS=14.7,VC TS=100
U  SG=134.4,V  SG=.5,W  SG=14.1
P  SG=0,Q  SG=0,R  SG=0
ROLSG=2,PITSG=3,YAWSG=0
X  SG=-6.5,Y  SG=0,ALTSG=7.125
ERROR CONTROLS
P1 FR=.0001
PT TS=.0001,VT TS=.0001
PC TS=.0001
VC TS=.0001
```

```
PRINT CONTROL=3
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TS=1,VT TS=1,PC TS=1,VC TS=1,P1 FR=1
STEADY STATE
XIC=X
ALL STATES
PRINTER PLOTS
DISPLAY1
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
X  SG,VS,TIME
Y  SG,VS,TIME
DISPLAY2
ALTSG,VS,TIME
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
P  SG,VS,TIME
DISPLAY3
Q  SG,VS,TIME
R  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY4
PT TS,VS,TIME
VT TS,VS,TIME
PC TS,VS,TIME
VC TS,VS,TIME
RELIEFA,VS,TIME
DISPLAY5
PRATIO,VS,TIME
R21,VS,TIME
GAPLWF,VS,TIME
GAPLWR,VS,TIME
GAPRWF,VS,TIME
DISPLAY6
GAPRWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
GAPCG,VS,TIME
TENERGY,VS,TIME
TINC=.02,TMAX=1,PRATE=1,INT MODE=6
TITLE=R-ARPV W/IACS, LANDING W/ FULL AERO., 6 DOF, AND ARRESTMENT
PLOT ID = J.G.BRISTER,MS 41-47,655-5260
SIMULATE
```

```
TITLE=            FILE  RLAS81
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=129.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=2860,IYYSG=2680,IZZSG=5120,IXZSG=0,IXYSG=0,IYZSG=0
XO DL=-.032 ,XA DL= -1.203,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADOL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
ZO DL=-.480
MO DL=.0038,MALDL=-.464,MADOL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,ZSPDL=.25
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=168.9,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU2=1
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,2140,25000,30000
2000,2000,0,0
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
0,0
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
```

```
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLTK, 2
22,0,69.1,1
TABLE, XYZTK, 16
85.39,3.06,0,67.5
81.06,7.39,0,22.5
75,8,0,0
65,8,0,0
51,8,0,0
37,8,0,0
26.94,7.39,0,-22.5
22.61,3.06,0,-67.5
TABLE, DSMTK, 12
19.2,1,.2
19.2,1,.2
6,1,.2
14,1,.7
14,1,.7
14,1,.7
19.2,1,.7
19.2,1,.7
TABLE, IALTK, 16
1,.0122,29.55,10
1,.0122,29.55,10
1,.00515,29.55,10
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
1,0,34.55,0
TABLE, RELTK, 4
0,2,4,100
0,0,144,144
TABLE,FTAFU2,4
0,16.7,18.7,1000
0,0,144,144
PARAMETER VALUES
TSWITCH=0.
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTRDL=-.0456
PARAMETER VALUES
FINMA S=0,FINMA E=0,FINMA T=0,FINMA R=0
REARMU=.7,FRONTMU=.2,RVCRP=2.,RVSATP=4.,RVAREA=144.,KOUNT=1
AN FU=1
AMASS=129.5
ANRTK=0,DL TK=0,H  TK=0
PA TK=14.7,WCUTK=0,TCUTK=520
WTRTK=180,TTRTK=520,NE TK=8
CDGTK=.9,NSTTK=1,NPTTK=10
BSTTK=216.6,WLTTK=83
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=168.6,WLCTK=100,TAUTK=.005,VU TK=60.
AMUTK=0,DMPTK=.02,EPCTK=1
IXXSG=2680,IYYSG=2860,IZZSG=5120
```

```
IXZSG=0,IXYSG=0,IYZSG=0
INITIAL CONDITIONS
PT TK=15.93,VT TK=93.9
PC TK=14.7,VC TK=46.1
U  SG=141.74,V  SG=36.94,W  SG=37.69
P  SG=3.56,Q  SG=1.27,R  SG=0
ROLSG=4.96,PITSG=12.67,YAWSG=2.96
X  SG=0,Y  SG=0,ALTSG=3.75
PRINT CONTROL=4
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TK=1,VT TK=1,PC TK=1,VC TK=1
STEADY STATE
XIC-X
ALL STATES
PRINTER PLOTS
DISPLAY1
ROLSG,VS,TIME
PITSG,VS,TIME
YAWSG,VS,TIME
X  SG,VS,TIME
Y  SG,VS,TIME
DISPLAY2
ALTSG,VS,TIME
U  SG,VS,TIME
V  SG,VS,TIME
W  SG,VS,TIME
P  SG,VS,TIME
DISPLAY3
Q  SG,VS,TIME
R  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY4
PT TK,VS,TIME
VT TK,VS,TIME
PC TK,VS,TIME
VC TK,VS,TIME
RELIEFA,VS,TIME
DISPLAY5
PRATIO,VS,TIME
R20,VS,TIME
GAPLWF,VS,TIME
GAPLWR,VS,TIME
GAPRWF,VS,TIME
DISPLAY6
GAPRWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
GAPCG,VS,TIME
TENERGY,VS,TIME
TINC=.02,TMAX=2,PRATE=1,INT MODE=5
TITLE=R-ARPV W/ACRS, LANDING W/ FULL AERO. AND 6 DOF
PLOT ID = S.J.BAUMGARTNER,MS ~1~~7,655-5260
SIMULATE
```

```
MODEL DESCRIPTION    ROCKWELL LAUNCH AIR SUPPLY SYSTEM, FILE RLMAS03
LOCATION=1,IO1
LOCATION=5,FR1,INPUTS=IO1
LOCATION=9,DV1,INPUTS=FR1,TK(PT=P,2)
LOCATION=31,IO2
LOCATION=35,FR2,INPUTS=IO2
LOCATION=37,DV2,INPUTS=FR2,TK(PC=P,2)
LOCATION=39,TK
INPUTS=DV1(W,2=WTR,T,2=TTR)
INPUTS=DV2(W,2=WCU,T,2=TCU)
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION, ROCKWELL LANDING WITH SUCTION BRAKING, FILE RLMAS04
LOCATION=1,IO1
LOCATION=3,DU1,INPUTS=IO1
LOCATION=5,FR1,INPUTS=DU1
LOCATION=9,DV1,INPUTS=FR1,TK(PT=P,2)
FORTRAN STATEMENTS
      WCUTK=FO LA
LOCATION=39,TK,INPUTS=DV1(W,2=WTR,T,2=TTR)
FORTRAN STATEMENTS
      W1 DV2=-WCUTK
      P1 DV2=PC TK
LOCATION=37,DV2
LOCATION=55,FR2,INPUTS=DV2
FORTRAN STATEMENTS
      FINLA=W2 FR2
LOCATION=52,LA
LOCATION=75,DV3,INPUTS=FR2
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION,  ROCKWELL LANDING W-O SUCTION BRAKING, FILE RLMAS07
LOCATION=1,IO1
LOCATION=5,FR1,INPUTS=IO1
LOCATION=9,DV1,INPUTS=FR1,TK(PT=P,2)
LOCATION=39,TK
INPUTS=DV1(W,2=WTR,T,2=TTR)
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION, ROCKWELL AIR BAG LANDING WITH ARRESTMENT, FILE RLMBA1
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,VTOTAL,RELIEFR,RELIEFL,,AACCEL,LACCEL,
   GAPLWF,GAPRWF,GAPLWR,GAPRWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH,
   ZFORCE,STROKE,XACCEL
ADD TABLES=XYZB,21,GAP,9
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          LANDING APPROACH
C
LOCATION = 65      TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
       VW2 =UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2    +  WW*(SIN(RR)*COS(PP))
       WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
      1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
      2    +  WW*COS(RR)*COS(PP)
       UW VA=UW2
       VW VA=VW2
       WW VA=WW2
LOCATIO
6     VA          INPUTS=SG
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
       FINMA2 = VT VA*SIN(FO MA1*3.14159/180.)
       RPD=.01745324
       CALVA=COS(AL VA*RPD)
       SALVA=SIN(AL VA*RPD)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C          GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59      FU       INPUTS=SG(X=FIN)
LOCATION = 67      MA3      INPUTS=SG(ALT=C2),FU(FO=FIN)
FORTRAN STATEMENTS
C
C          COMPONENTS MA E, MA S, MA T, AND  MA R  COMBINE O.C. OUTPUT
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 102     TA
LOCATION = 122     MA E     INPUTS=TA(A2=C2,D2=C1)
LOCATION = 124     MA S     INPUTS=TA(B2=C2,D2=C1)
LOCATION = 126     MA R     INPUTS=TA(C2=C2,D2=C1)
```

```
LOCATION = 128     MA T     INPUTS=TA2(D2=C2),TA(D2=C1)
LOCATION = 53     TB
FORTRAN STATEMENTS
       IF (FO MA E .GT. 20.) FO MA E = 20.
       IF (FO MA E .LT. -20.) FO MA E = -20.
       IF (FO MA T .LT. 600.) FO MA T = 600.
       IF (FO MA T .GT. 3000.) FO MA T = 3000.
       IF (TSWITCH .LT. 0.1) FO MA T = 0.
       ELEOL = FO MA E
       TH TG = FO MA T
       SPOOL=A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
       IF (FO MA S .GT. 45.) FO MA S = 45.
       IF (FO MA S .LT. -45.) FO MA S = -45.
       IF (FO MA R .GT. 15.) FO MA R = 15.
       IF (FO MA R .LT. -15.) FO MA R = -15.
       FSPOL = FO MA S
       RUDOL = FO MA R
LOCATION=34     DL          INPUTS=VA,OL,TG
FORTRAN STATEMENTS
       IF (KOUNT .EQ. 1) WRITE(6,10) (RELAB(I),I=4,11),(DSMAB(I),I=4,27),
      1   (FTAFU2(I),I=4,11),(FTAFU3(I),I=4,11)
   10 FORMAT(8E13.5)
       RELAB(5)=RVCRP
       RELAB(6)=RVSATP
       RELAB(10)=RELAB(11)=RVAREA
       DSMAB(6)=DSMAB(9)=FRONTMU
       DSMAB(12)=DSMAB(15)=DSMAB(18)=DSMAB(21)=DSMAB(24)=DSMAB(27)=REARMU
       FTAFU2(5)=14.7+RVCRP
       FTAFU2(6)=14.7+RVSATP
       FTAFU2(10)=FTAFU2(11)=RVAREA
       FTAFU3(5)=14.7+RVCRP
       FTAFU3(6)=14.7+RVSATP
       FTAFU3(10)=FTAFU3(11)=RVAREA
LOCATION=171     EJ1     INPUTS=AB(PTR=P,3)
LOCATION=173     EJ2     INPUTS=AB(PTL=P,3)
FORTRAN STATEMENTS
       IF (VTRAB .LT. 25) P1 EJ1=49.68
       IF (VTRAB .LT. 25) W1 EJ1=35.16
       IF (VTLAB .LT. 25) P1 EJ2=49.68
       IF (VTLAB .LT. 25) W1 EJ2=35.16
LOCATION=142    AB    INPUTS=SG
INPUTS=EJ1(W,3=WTR,T,3=TTR)
INPUTS=EJ2(W,3=WTL,T,3=TTL)
LOCATION = 145     FU2     INPUTS=AB(PTR=FIN)
LOCATION=152     FU3     INPUTS=AB(PTL=FIN)
FORTRAN STATEMENTS
       RELIEFR = FO FU2
       RELIEFL=FO FU3
LOCATION=130     AS     INPUTS=SG
LOCATION=16    S3
INPUTS=AB(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=OL(2=3),OL(2=3)
INPUTS=AS(FX=FX,1,FY=FY,1,FZ=FZ,1,TX=TX,1,TY=TY,1,TZ=TZ,1)
FORTRAN STATEMENTS
       UD SG=FX4S3/AMASS-(Q  SG*W  SG-R  SG*V  SG)*.01745-
```

```
     1       32.2*SIN(PITSG*.01745)
      VD SG=FY4S3/AMASS-(R  SG*U  SG-P  SG*W  SG)*.01745*
     1       32.2*COS(PITSG*.01745)*SIN(ROLSG*.01745)
      WD SG=FZ4S3/AMASS-(P  SG*V  SG-Q  SG*U  SG)*.01745*
     1       32.2*COS(PITSG*.01745)*COS(ROLSG*.01745)
LOCATION=10    SG    INPUTS=S3(TX,4=TX,TY,4=TY,TZ,4=TZ)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
     1  +.5*(IXXSG*P  SG*P  SG+IYYSG*Q  SG*Q  SG+IZZSG*R  SG*R  SG
     2  + IXZSG*P  SG*R  SG)
      PENERGY= (PTRAB-PA AB)*VTRAB*144. + (PTLAB-PA AB)*VTLAB*144.
     1   + AMASS*32.2*ALTSG
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(PD SG*PD SG+QD SG*QD SG+RD SG*RD SG)
      LACCEL= (SQRT(UD SG*UD SG+VD SG*VD SG+WD SG*WD SG))/32.2
      VTOTAL=SQRT(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
      ZFORCE=-WD SG/32.2
      STROKE=4.427-ALTSG
      XACCEL=EU VA*COS(PITSG)+EW VA*SIN(PITSG)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTSG*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=ROLSG
      PITTR=PITSG
      YAWTR=YAWSG
LOCATION = 110    TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTSG*12.+W2 TR
      GAPLWF=GAP(4)
      GAPRWF=GAP(5)
      GAPLWR=GAP(6)
      GAPRWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTSG*12. -31.5
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION, ROCKWELL CUSHION LANDING WITH ARRESTMENT, FILE RLMCA2
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPLWF,GAPRWF,GAPLWR,GAPRWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH
ADD TABLES=XYZ8,21,GAP,9
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          LANDING APPROACH
C
LOCATION = 65      TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
       VW2 =UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2    +  WW*(SIN(RR)*COS(PP))
       WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
      1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
      2    +  WW*COS(RR)*COS(PP)
       UW VA=UW2
       VW VA=VW2
       WW VA=WW2
LOCATION=46     VA          INPUTS=SG
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
       FINMA2 = VT VA*SIN(FO MA1*3.14159/180.)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C          GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59      FU       INPUTS=SG(X=FIN)
LOCATION = 67      MA3      INPUTS=SG(ALT=C2),FU(FO=FIN)
FORTRAN STATEMENTS
C
C          COMPONENTS MA E, MA S, MA T, AND  MA R  COMBINE O.C. OUTPUT
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 102     TA
LOCATION = 122     MA E     INPUTS=TA(A2=C2,D2=C1)
LOCATION = 124     MA S     INPUTS=TA(B2=C2,D2=C1)
LOCATION = 126     MA R     INPUTS=TA(C2=C2,D2=C1)
LOCATION = 128     MA T      INPUTS=TA2(D2=C2),TA(D2=C1)
LOCATION = 53     TB
FORTRAN STATEMENTS
       IF (FO MA E .GT. 20.) FO MA E = 20.
       IF (FO MA E .LT. -20.) FO MA E = -20.
```

```
      IF (FO MA T .LT. 600.) FO MA T = 600.
      IF (FO MA T .GT. 3000.) FO MA T = 3000.
      IF (TSWITCH .LT. 0.1) FO MA T = 0.
      ELEOL = FO MA E
      TH TG = FO MA T
      SPOOL=A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (FO MA S .GT. 45.) FO MA S = 45.
      IF (FO MA S .LT. -45.) FO MA S = -45.
      IF (FO MA R .GT. 15.) FO MA R = 15.
      IF (FO MA R .LT. -15.) FO MA R = -15.
      FSPDL = FO MA S
      RUDDL = FO MA R
LOCATION=34     DL          INPUTS=VA,OL,TG
FORTRAN STATEMENTS
      IF (KOUNT .EQ. 1) WRITE(6,10) (RELTK(I),I=4,11),(DSMTK(I),I=4,27),
     1   (FTAFU(I),I=4,11)
   10 FORMAT(8E13.5)
      RELTK(5)=RVCRP
      RELTK(6)=RVSATP
      RELTK(10)=RELTK(11)=RVAREA
      DSMTK(6)=DSMTK(9)=DSMTK(12)=FRONTMU
      DSMTK(18)=DSMTK(21)=DSMTK(24)=DSMTK(27)=REARMU
      DSMTK(15)=REARMU
      FTAFU(5)=14.7*RVCRP
      FTAFU(6)=14.7*RVSATP
      FTAFU(10)=FTAFU(11)=RVAREA
LOCATION=142    TK    INPUTS=SG
LOCATION = 145     FU2     INPUTS=TK(PT=FIN)
FORTRAN STATEMENTS
      RELIEFA = FO FU2
      PRATIO=(PC TK-PA TK)/(PT TK-PA TK)
LOCATION=130     AS     INPUTS=SG
LOCATION=16    S3
INPUTS=TK(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=OL(2=3),OL(2=3)
INPUTS=AS(FX=FX,1,FY=FY,1,FZ=FZ,1,TX=TX,1,TY=TY,1,TZ=TZ,1)
FORTRAN STATEMENTS
      UD SG=FX*S3/AMASS-(Q  SG*W  SG-R  SG*V  SG)*.01745-
     1      32.2*SIN(PITSG*.01745)
      VD SG=FY*S3/AMASS-(R  SG*U  SG-P  SG*W  SG)*.01745+
     1      32.2*COS(PITSG*.01745)*SIN(ROLSG*.01745)
      WD SG=FZ*S3/AMASS-(P  SG*V  SG-Q  SG*U  SG)*.01745+
     1      32.2*COS(PITSG*.01745)*COS(ROLSG*.01745)
LOCATION=10    SG    INPUTS=S3(TX,4=TX,TY,4=TY,TZ,4=TZ)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
     1  +.5*(IXXSG*P  SG*P  SG+IYYSG*Q  SG*Q  SG+IZZSG*R  SG*R  SG
     2  + IXZSG*P  SG*R  SG)
      PENERGY= (PT TK-PA TK)*VT TK*144. + (PC TK-PA TK)*VC TK*144.
     1   + AMASS*32.2*ALTSG
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(PD SG*PD SG+QD SG*QD SG+RD SG*RD SG)
      LACCEL= (SQRT(UD SG*UD SG+VD SG*VD SG+WD SG*WD SG))/32.2
      VTOTAL=SQRT(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
```

```
      CNT=0.
   20 C
CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTSG*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=ROLSG
      PITTR=PITSG
      YAWTR=YAWSG
LOCATION = 110     TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTSG*12.+W2 TR
      GAPLWF=GAP(4)
      GAPRWF=GAP(5)
      GAPLWR=GAP(6)
      GAPRWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTSG*12. -31.
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION, ROCKWELL ELASTIC CUSHION LANDING WITH ARRESTMENT, FILE RLMCE2
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPLWF,GAPRWF,GAPLWR,GAPRWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH
ADD TABLES=XYZB,21,GAP,9
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          LANDING APPROACH
C
LOCATION = 65      TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
       VW2 =UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2    +  WW*(SIN(RR)*COS(PP))
       WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
      1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
      2    +  WW*COS(RR)*COS(PP)
       UW VA=UW2
       VW VA=VW2
       WW VA=WW2
LOCATION=46     VA          INPUTS=SG
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
       FINMA2 = VT VA*SIN(FO MA1*3.14159/180.)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C          GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59      FU       INPUTS=SG(X=FIN)
LOCATION = 67      MA3      INPUTS=SG(ALT=C2),FU(FO=FIN)
FORTRAN STATEMENTS
C
C          COMPONENTS MA E, MA S, MA T, AND  MA R  COMBINE O.C. OUTPUT
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 102     TA
LOCATION = 122     MA E     INPUTS=TA(A2=C2,D2=C1)
LOCATION = 124     MA S     INPUTS=TA(B2=C2,D2=C1)
LOCATION = 126     MA R     INPUTS=TA(C2=C2,D2=C1)
LOCATION = 128     MA T      INPUTS=TA2(D2=C2),TA(D2=C1)
LOCATION = 53     TB
FORTRAN STATEMENTS
      IF (FO MA E .GT. 20.) FO MA E = 20.
      IF (FO MA E .LT. -20.) FO MA E = -20.
```

```
      IF (FO MA T .LT. 600.) FO MA T = 600.
      IF (FO MA T .GT. 3000.) FO MA T = 3000.
      IF (TSWITCH .LT. 0.1) FO MA T = 0.
      ELEOL = FO MA E
      TH TG = FO MA T
      SPOOL=A2 TB
LOCATION = 51    TG
LOCATION=2     OL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (FO MA S .GT. 45.) FO MA S = 45.
      IF (FO MA S .LT. -45.) FO MA S = -45.
      IF (FO MA R .GT. 15.) FO MA R = 15.
      IF (FO MA R .LT. -15.) FO MA R = -15.
      FSPOL = FO MA S
      RUDDL = FO MA R
LOCATION=34    DL          INPUTS=VA,OL,TG
FORTRAN STATEMENTS
      IF (KOUNT .EQ. 1) WRITE(6,10) (RELTS(I),I=4,11),(DM TS(I),I=4,19),
     1   (FTAFU(I),I=4,11)
   10 FORMAT(8E13.5)
      RELTS(5)=RVCRP
      RELTS(6)=RVSATP
      RELTS(10)=RELTS(11)=RVAREA
      DM TS(5)=DM TS(7)=DM TS(9)=FRONTMU
      DM TS(11)=DM TS(13)=DM TS(15)=DM TS(17)=REARMU
      DM TS(19)=REARMU
      FTAFU(5)=14.7+RVCRP
      FTAFU(6)=14.7+RVSATP
      FTAFU(10)=FTAFU(11)=RVAREA
      P2 IO2=P1 FR
LOCATION=164     IO2
LOCATION=162     FR     INPUTS=TS(PT=P,2),IO2(2=1)
FORTRAN STATEMENTS
      WTRTS=W2 FR*2
LOCATION=142    TS    INPUTS=SG,FR(T,2=TTR)
LOCATION = 145     FU2     INPUTS=TS(PT=FIN)
FORTRAN STATEMENTS
      RELIEFA = FO FU2
      PRATIO=(PC TS-PA TS)/(PT TS-PA TS)
LOCATION=130     AS     INPUTS=SG
LOCATION=16    S3
INPUTS=TS(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=DL(2=3),OL(2=3)
INPUTS=AS(FX=FX,1,FY=FY,1,FZ=FZ,1,TX=TX,1,TY=TY,1,TZ=TZ,1)
FORTRAN STATEMENTS
      UD SG=FX4S3/AMASS-(Q  SG*W  SG-R  SG*V  SG)*.01745-
     1      32.2*SIN(PITSG*.01745)
      VD SG=FY4S3/AMASS-(R  SG*U  SG-P  SG*W  SG)*.01745+
     1      32.2*COS(PITSG*.01745)*SIN(ROLSG*.01745)
      WD SG=FZ4S3/AMASS-(P  SG*V  SG-
SG*U  SG)*.01745+
     1      32.2*COS(PITSG*.01745)*COS(ROLSG*.01745)
LOCATION=10    SG    INPUTS=S3(TX,4=TX,TY,4=TY,TZ,4=TZ)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
     1  +.5*(IXXSG*P  SG*P  SG+IYYSG*Q  SG*Q  SG+IZZSG*R  SG*R  SG
     2  + IXZSG*P  SG*R  SG)
      PENERGY= (PT TS-PA TS)*VT TS*144. + (PC TS-PA TS)*VC TS*144.
```

```
     1    + AMASS*32.2*ALTSG
          TENERGY= KENERGY+PENERGY
          KOUNT=KOUNT+1
          AACCEL=SQRT(PD SG*PD SG+QD SG*QD SG+RD SG*RD SG)
          LACCEL= (SQRT(UD SG*UD SG+VD SG*VD SG+WD SG*WD SG))/32.2
          VTOTAL=SQRT(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
          CNT=0.
   20     CNT=CNT+1.
          I=CNT+.001
          IF (I .GT.1) GAP(I+2) = ALTSG*12. +W2 TR
          U1 TR=XYZB(3*I+1)
          V1 TR=XYZB(3*I+2)
          W1 TR=XYZB(3*I+3)
          ROLTR=ROLSG
          PITTR=PITSG
          YAWTR=YAWSG
LOCATION = 110     TR
FORTRAN STATEMENTS
          IF (CNT .LT. 6.) GO TO 20
          GAP(9)=ALTSG*12.+W2 TR
          GAPLWF=GAP(4)
          GAPRWF=GAP(5)
          GAPLWR=GAP(6)
          GAPRWR=GAP(7)
          GAPFF =GAP(8)
          GAPFR =GAP(9)
          GAPCG =ALTSG*12. -31.
END OF MODEL
PRINT
```

```
MODEL DESCRIPTION     ROCKWELL CUSHION LANDING, FILE RLMSB1
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPLWF,GAPRWF,GAPLWR,GAPRWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH
ADD TABLES=XYZB,21,GAP,9
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          LANDING APPROACH
C
LOCATION = 65      TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
       VW2 =UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2    +  WW*(SIN(RR)*COS(PP))
       WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
      1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
      2    +  WW*COS(RR)*COS(PP)
       UW VA=UW2
       VW VA=VW2
       WW VA=WW2
LOCATION=46     VA          INPUTS=SG
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
       FINMA2 = VT VA*SIN(FD MA1*3.14159/180.)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED LANDING APPROACH
C          GLIDE PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING THE FINAL LANDING APPROACH.
C
LOCATION = 59      FU       INPUTS=SG(X=FIN)
LOCATION = 67      MA3      INPUTS=SG(ALT=C2),FU(FD=FIN)
FORTRAN STATEMENTS
C
C          COMPONENTS MA E, MA S, MA T, AND  MA R  COMBINE O.C. OUTPUT
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 102     TA
LOCATION = 122     MA E     INPUTS=TA(A2=C2,D2=C1)
LOCATION = 124     MA S     INPUTS=TA(B2=C2,D2=C1)
LOCATION = 126     MA R     INPUTS=TA(C2=C2,D2=C1)
LOCATION = 128     MA T      INPUTS=TA2(D2=C2),TA(D2=C1)
LOCATION = 53     TB
FORTRAN STATEMENTS
       IF (FD MA E .GT. 20.) FD MA E = 20.
       IF (FD MA E .LT. -20.) FD MA E = -20.
```

```
      IF (FO MA T .LT. 600.) FO MA T = 600.
      IF (FO MA T .GT. 3000.) FO MA T = 3000.
      IF (TSWITCH .LT. .1) FO MA T = 0.
      ELEOL = FO MA E
      TH TG = FO MA T
      SPOOL=A2 TB
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
      IF (FO MA S .GT. 45.) FO MA S = 45.
      IF (FO MA S .LT. -45.) FO MA S = -45.
      IF (FO MA R .GT. 15.) FO MA R = 15.
      IF (FO MA R .LT. -15.) FO MA R = -15.
      FSPDL = FO MA S
      RUDDL = FO MA R
LOCATION=34     DL          INPUTS=VA,OL,TG
FORTRAN STATEMENTS
      IF (KOUNT .EQ. 1) WRITE(6,10) (RELTK(I),I=4,11),(DSMTK(I),I=4,27),
     1   (FTAFU(I),I=4,11)
   10 FORMAT(8E13.5)
      RELTK(5)=RVCRP
      RELTK(6)=RVSATP
      RELTK(10)=RELTK(11)=RVAREA
      DSMTK(6)=DSMTK(9)=DSMTK(12)=FRONTMU
      DSMTK(18)=DSMTK(21)=DSMTK(24)=DSMTK(27)=REARMU
      DSMTK(15)=REARMU
      FTAFU(5)=14.7+RVCRP
      FTAFU(6)=14.7+RVSATP
      FTAFU(10)=FTAFU(11)=RVAREA
LOCATION=142    TK    INPUTS=SG
LOCATION = 166     FU2     INPUTS=TK(PT=FIN)
FORTRAN STATEMENTS
      RELIEFA = FO FU2
      PRATIO=(PC TK-PA TK)/(PT TK-PA

      FX1S3 = 0
      FY1S3 = 0
      FZ1S3 = 0
      TX1S3 = 0
      TY1S3 = 0
      TZ1S3 = 0
LOCATION=16    S3
INPUTS=TK(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=OL(2=3),OL(2=3)
FORTRAN STATEMENTS
      UD SG=FX4S3/AMASS-(Q  SG*W  SG-R  SG*V  SG)*.01745-
     1       32.2*SIN(PITSG*.01745)
      VD SG=FY4S3/AMASS-(R  SG*U  SG-P  SG*W  SG)*.01745+
     1       32.2*COS(PITSG*.01745)*SIN(ROLSG*.01745)
      WD SG=FZ4S3/AMASS-(P  SG*V  SG-Q  SG*U  SG)*.01745+
     1       32.2*COS(PITSG*.01745)*COS(ROLSG*.01745)
LOCATION=10    SG    INPUTS=S3(TX,4=TX,TY,4=TY,TZ,4=TZ)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
     1  +.5*(IXXSG*P  SG*P  SG+IYYSG*Q  SG*Q  SG+IZZSG*R  SG*R  SG
     2  + IXZSG*P  SG*R  SG)
      PENERGY= (PT TK-PA TK)*VT TK*144. + (PC TK-PA TK)*VC TK*144.
     1   + AMASS*32.2*ALTSG
```

```
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(PD SG*PD SG+QD SG*QD SG+RD SG*RD SG)
      LACCEL= (SQRT(UD SG*UD SG+VD SG*VD SG+WD SG*WD SG))/32.2
      VTOTAL=SQRT(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTSG*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=ROLSG
      PITTR=PITSG
      YAWTR=YAWSG
LOCATION = 110    TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTSG*12.+W2 TR
      GAPLWF=GAP(4)
      GAPRWF=GAP(5)
      GAPLWR=GAP(6)
      GAPRWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
      GAPCG =ALTSG*12. -31.
END OF MODEL
PRINT
```

```
TITLE=            FILE  RTACE1
PARAMETER VALUES
AN FU4=1,AN FU5=1,AN FU6=1,AN FU3=1
AN FU7=1,AN FU8=1,AN FU9=1
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=228.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=6240,IYYSG=4840,IZZSG=10440,IXZSG=0,IXYSG=0,IYZSG=0
X0 DL=-.032 ,XA DL= -1.048,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADDL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
Z0 DL=-.370
M0 DL=.0038,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,ZSPDL=.25
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=230.,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
P1 I02=14.7,T1 I02=520,SH1I02=0
CO1I02=0
GAXTG=1,GAYTG=0,GAZTG=0,X0 TG=0,Y0 TG=0,Z0 TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU2=1
TABLE,FTAFU3,5
0,10,20,50,500
-6,-6,-4,-3,-3
TABLE,FTAFU4,4
0,100,150,10000
-.0176,-.0176,0,0
TABLE,FTAFU5,4
0,100,150,10000
-.178,-.176,-.464,-.464
TABLE,FTAFU6,4
0,100,150,10000
-.008,-.008,0,0
TABLE,FTAFU7,4
0,100,150,10000
-.378,-.378,0,0
TABLE,FTAFU8,4
0,100,150,10000
-.0811,-.0811,0,0
TABLE,FTAFU9,4
0,100,150,10000
-.0456,-.0456,0,0
TABLE,TPD102,2
0,1
0,10000
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,202.7,220,350
4.3,4.3,4.3,4.3
TABLE,A2TTA2,2
```

```
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
2700,2700
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLTS, 9
21,7,24,.05,.01,.3
21,7,24,.05,.01,.3
21,7,24,.05,.01,.3
TABLE, XYZTS, 16
138.41,3.44,0,67.5
133.54,8.31,0,22.5
118.45,9,0,0
94,9,0,0
68.4,9,0,0
42.8,9,0,0
26.56,8.31,0,-22.5
21.69,3.44,0,-67.5
TABLE, DM TS, 8
45,.025
45,.025
23.2,.025
25.6,.025
25.6,.025
25.6,.025
45,.025
45,.025
TABLE, IALTS, 16
1,.0282,12,4
2,.0282,12,4
```

```
3,.0282,12,4
3,.0282,12,4
3,.0282,12,4
3,.0282,12,4
2,.0282,12,4
1,.0282,12,4
TABLE, RELTS, 4
0,1.8,3.8,100
0,0,144,144
TABLE,ENDTS,2
9,0
9,0
TABLE,SPHTS,3,3
1,2,3
0,5,25
0,1.58,1.6
0,1.58,1.6
0,.8,2.
TABLE,STHTS,2,3
1,2,3
0,27
0,1
0,1
0,1
TABLE,BWTTS,4
233.6,69,168.6,107.5
0,0,0,0
TABLE,FTAFU2,4
0,16.5,18.5,1000
0,0,144,144
TABLE,PR FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
1.4,1.16,1.159,1.158,1.157,1.154,1.14,1.09,1,1,1
1.4,1.09,1.08,1.07,1.027,1,1,1,1,1,1
TABLE,ET FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
.01,.15,.35,.6,.76,.8,.8,.6,.01,.01,.01
.01,.05,.6,.7,.4,.01,.01,.01,.01,.01,.01
PARAMETER VALUES
EN FR=7.5,UA FR=1,TAMFR=520
TSWITCH=1.,FINMA T=0.,FINMA S=0,FINMA E=0,FINMA R=0
PARAMETER VALUES
REARMU=.2,FRONTMU=.2,RVCRP=1.8,RVSATP=3.8,RVAREA=0.,KOUNT=1
AN FU=1
AMASS=228.4
ANETS=-8,PA TS=14.7
PTMTS=2,CAVTS=0,SPBTS=0
CDGTS=.9
WCUTS=0,TCUTS=520
CD1TS=.6,CD2TS=.2,CDATS=.9
TAUTS=.1,VU TS=6
DMPTS=.02,EPCTS=1
INITIAL CONDITIONS
P1 FR=14.2
PT TS=16.1,VT TS=82.7
PC TS=15.3,VC TS=24.9
```

```
U  SG=210,V  SG=0,W  SG=.89
P  SG=0,Q  SG=-.18,R  SG=0
ROLSG=0,PITSG=.26,YAWSG=0
X  SG=0,Y  SG=0,ALTSG=4.35
ERROR CONTROLS
P1 FR=.01
PT TS=.0001
VT TS=.0001
PC TS=.0001
VC TS=.0001
U  SG=.01,V  SG=.01,W  SG=.01
P  SG=.01,Q  SG=.01,R  SG=.01
ROLSG=.01,PITSG=.01,YAWSG=.01
X  SG=.01,Y  SG=.01,ALTSG=.01
PRINT CONTROL=3
LINEAR ANALYSIS
PRINTER PLOTS,
DISPLAY1
PITSG,VS,TIME
X  SG,VS,TIME
ALTSG,VS,TIME
U  SG,VS,TIME
ELEDL,VS,TIME
DISPLAY2
W  SG,VS,TIME
Q  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY3
PT TS,VS,TIME
VT TS,VS,TIME
PC TS,VS,TIME
VC TS,VS,TIME
PRATIO,VS,TIME
DISPLAY4
R17,VS,TIME
GAPLWF,VS,TIME
GAPLWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
DISPLAY5
GAPCG,VS,TIME
TYTTS,VS,TIME
FXTTS,VS,TIME
FZTTS,VS,TIME
DISPLAY6
ALTSG,VS,X  SG
FO MA E,VS,TIME
TINC=.2,TMAX=10,PRATE=1,INT MODE=6
PRINT CONTROL=3
TITLE=R-ARPV W/IACS (ELASTIC), TAKEOFF W/ 3 DOF LONGITUDINAL
PLOT ID = J.G.BRISTER,MS 41-47,655-5260
SIMULATE
```

```
TITLE=            FILE  RTALP1
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=245.5,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=6240,IYYSG=4840,IZZSG=10440,IXZSG=0,IXYSG=0,IYZSG=0
X0 DL=-.032 ,XA DL= -1.048,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADDL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
Z0 DL=-.370
M0 DL=.0038,MALDL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,ZSPDL=.25
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.064,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=230.,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
P1 I02=14.7,T1 I02=520,SH1I02=0
C01I02=0
GAXTG=1,GAYTG=0,GAZTG=0,X0 TG=0,Y0 TG=0,Z0 TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU2=1
TABLE,TP0I02,2
0,1
0,10000
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,202.7,220,350
4.17,4.17,4.17,4.17
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
2700,2700
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
```

```
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLTK, 2
14,0,44,1
TABLE, XYZTK, 26
140.5,5.1,0,11.25
136.6,14.44,0,33.75
129.4,21.62,0,56.25
120.1,25.5,0,78.75
107.5,26,0,0
92.5,26,0,0
77.5,26,0,0
62.5,26,0,0
47.5,26,0,0
34.9,25.5,0,-11.25
25.6,21.62,0,-33.75
18.4,14.44,0,-56.25
14.5,5.1,0,-78.75
TABLE, DSMTK, 20
12.96,1,.2
12.96,1,.2
12.96,1,.2
12.96,1,.2
15,1,.2
15,1,.2
15,1,.2
15,1,.2
15,1,.2
12.96,1,.2
12.96,1,.2
12.96,1,.2
12.96,1,.2
TABLE, IALTK, 26
1,.0186,12,20
1,.0186,12,20
1,.0186,12,20
1,.0186,12,20
1,.0186,19,13
1,.0186,19,13
1,.0186,19,13
1,.0186,19,13
1,.0186,19,13
1,.0186,19,13
1,.0186,19,13
1,.0186,19,13
1,.0186,19,13
TABLE, RELTK, 4
0,2,4,100
0,0,0,0
TABLE,FTAFU2,4
```

```
0,16.7,18.7,1000
0,0,0,0
TABLE,PR FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
1.4,1.16,1.159,1.158,1.157,1.154,1.14,1.09,1,1,1
1.4,1.09,1.08,1.07,1.027,1,1,1,1,1,1
TABLE,ET FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
.01,.15,.35,.6,.76,.8,.8,.6,.01,.01,.01
.01,.05,.6,.7,.4,.01,.01,.01,.01,.01,.01
PARAMETER VALUES
EN FR=7.0,UA FR=1,TAMFR=520
TSWITCH=1.,FINMA T=0.,FINMA S=0,FINMA E=0,FINMA R=0
XTROL=-.0176
PARAMETER VALUES
REARMU=.2,FRONTMU=.2,RVCRP=2.,RVSATP=4.,RVAREA=0.,KOUNT=1
AN FU=1
AMASS=245.5
ANRTK=0,DL TK=0,H  TK=0
PA TK=14.7,WCUTK=0,TCUTK=520
NE TK=-13
CDGTK=.9,NSTTK=1,NPTTK=10
WLTTK=66,BSTTK=237.5
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=170.,WLCTK=102.,TAUTK=.005,VU TK=6.
AMOTK=0,DMPTK=.02,EPCTK=1
INITIAL CONDITIONS
P1 FR=14.7
PT TK=16.14,VT TK=34
PC TK=15.42,VC TK=76
U  SG=100,V  SG=0,W  SG=0
P  SG=0,Q  SG=0,R  SG=0
ROLSG=0,PITSG=0,YAWSG=0
X  SG=0,Y  SG=0,ALTSG=4.17
PRINT CONTROL=4
PRINTER PLOTS
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TK=1,VT TK=1,PC TK=1,VC TK=1,W  SG=1,Q  SG=1,
   PITSG=1,ALTSG=1,P1 FR=1
STEADY STATE
XIC-X
INT CONTROL,PT TK=0
SS PARAMETER=PT TK,IC
SS START=15
SS STOP=18
SS POINTS=7
DISPLAY1
W2 FR,VS,PT TK
T2 FR,VS,PT TK
WTATK,VS,PT TK
WTRO,VS,PT TK
WTCTK,VS,PT TK
STEADY STATE
INT CONTROL, U  SG=1,PT TK=1
PRINTER PLOTS
```

```
DISPLAY1
PITSG,VS,TIME
X  SG,VS,TIME
ALTSG,VS,TIME
U  SG,VS,TIME
W2 FR,VS,TIME
DISPLAY2
W  SG,VS,TIME
Q  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY3
PT TK,VS,TIME
VT TK,VS,TIME
PC TK,VS,TIME
VC TK,VS,TIME
PRATIO,VS,TIME
DISPLAY4
R17,VS,TIME
GAPLWF,VS,TIME
GAPLWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
DISPLAY5
GAPCG,VS,TIME
TYTTK,VS,TIME
FXTTK,VS,TIME
FZTTK,VS,TIME
T2 FR,VS,TIME
DISPLAY6
ALTSG,VS,X  SG
FO MA E,VS,TIME
TINC=.02,TMAX=5,PRATE=1,INT MODE=5
PRINT CONTROL=3
TITLE=R-ARPV W/ACTS, TAKEOFF W/ 3 DOF LONGITUDINAL
PLOT ID = S.J.BAUMGARTNER,MS 41-47,655-5260
SIMULATE
XIC-X
LINEAR ANALYSIS
```

```
TITLE=            FILE  RTATD2
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=228.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=6240,IYYSG=4840,IZZSG=10440,IXZSG=0,IXYSG=0,IYZSG=0
X0 DL=-.032 ,XA DL= -1.048,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADOL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
Z0 DL=-.370
M0 DL=.0038,MALDL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,ZSPDL=.25
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=230.,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
P1 I02=14.7,T1 I02=520,SH1I02=0
CO1I02=0
GAXTG=1,GAYTG=0,GAZTG=0,X0 TG=0,Y0 TG=0,Z0 TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU2=1
TABLE,TPD1O2,2
0,1
0,10000
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,202.7,220,350
4.3,4.3,4.3,4.3
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
2700,2700
TABLE,A2TTA,2
0,50
0,0
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
```

```
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLTK, 2
22,7,69.1,1
TABLE, XYZTK, 16
126.489,3.06,0,67.5
122.159,7.39,0,22.5
109.249,8,0,0
87.833,8,0,0
64.7,8,0,0
41.567,8,0,0
26.94,7.39,0,-22.5
22.61,3.06,0,-67.5
TABLE, DSMTK, 12
19.2,1,.2
19.2,1,.2
19.7,1,.2
23.133,1,.2
23.133,1,.2
23.133,1,.2
19.2,1,.2
19.2,1,.2
TABLE, IALTK, 16
1,.0266,31.55,10
1,.0266,31.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
TABLE, RELTK, 4
0,2,4,100
0,0,0,0
TABLE,FTAFU2,4
0,16.7,18.7,1000
0,0,0,0
TABLE,PR FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
1.4,1.16,1.159,1.158,1.157,1.154,1.14,1.09,1,1,1
1.4,1.09,1.08,1.07,1.027,1,1,1,1,1,1
TABLE,ET FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
.01,.15,.35,.6,.76,.8,.8,.6,.01,.01,.01
.01,.05,.6,.7,.4,.01,.01,.01,.01,.01,.01
PARAMETER VALUES
EN FR=7.5,UA FR=1,TAMFR=520
TSWITCH=1.,FINMA T=0.,FINMA S=0,FINMA E=0,FINMA R=0
```

```
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTRDL=-.0456
PARAMETER VALUES
REARMU=.2,FRONTMU=.2,RVCRP=2.,RVSATP=4.,RVAREA=0.,KOUNT=1
AN FU=1
AMASS=228.4
ANRTK=0,DL TK=0,M  TK=0
PA TK=14.7,WCUTK=0,TCUTK=520
NE TK=-8
CDGTK=.9,NSTTK=1,NPTTK=10
WLTTK=76,BSTTK=233.15
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=168.6,WLCTK=107.5,TAUTK=.005,VU TK=6.
AMOTK=0,DMPTK=.02,EPCTK=1
INITIAL CONDITIONS
P1 FR=14.7
PT TK=16.5,VT TK=110
PC TK=15.6,VC TK=60
U  SG=100,V  SG=0,W  SG=0
P  SG=0,Q  SG=0,R  SG=0
ROLSG=0,PITSG=0,YAWSG=0
X  SG=0,Y  SG=0,ALTSG=4.3
PRINT CONTROL=4
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TK=1,VT TK=1,PC TK=1,VC TK=1,W  SG=1,Q  SG=1,
   PITSG=1,ALTSG=1,P1 FR=1
STEADY STATE
XIC-X
INT CONTROL, U  SG=1
PRINTER PLOTS
DISPLAY1
PITSG,VS,TIME
X  SG,VS,TIME
ALTSG,VS,TIME
U  SG,VS,TIME
W2 FR,VS,TIME
DISPLAY2
W  SG,VS,TIME
Q  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY3
PT TK,VS,TIME
VT TK,VS,TIME
PC TK,VS,TIME
VC TK,VS,TIME
PRATIO,VS,TIME
DISPLAY4
R17,VS,TIME
GAPLWF,VS,TIME
GAPLWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
DISPLAY5
GAPCG,VS,TIME
TYTTK,VS,TIME
```

```
FXTTK,VS,TIME
FZTTK,VS,TIME
T2 FR,VS,TIME
DISPLAY6
ALTSG,VS,X  SG
FO MA E,VS,TIME
TINC=.02,TMAX=5,PRATE=1,INT MODE=5
PRINT CONTROL=3
TITLE=R-ARPV W/ACTS, TAKEOFF W/ 3 DOF LONGITUDINAL
PLOT ID = S.J.BAUMGARTNER,MS 41-47,655-5260
SIMULATE
XIC-X
LINEAR ANALYSIS
```

```
TITLE=            FILE  RTATD1
PARAMETER VALUES
UW=0,VW=0,WW=0,RR=0,PP=0,YY=0,UW2=0,VW2=0,WW2=0,
UW VA=0,VW VA=0,WW VA=0,KENERGY=0,PENERGY=0,TENERGY=0
MA1DL=228.4,C  DL=6.46,XP1DL=0,ISWDL=3,STADL=0
IXXSG=6240,IYYSG=4840,IZZSG=10440,IXZSG=0,IXYSG=0,IYZSG=0
XO DL=-.032 ,XA DL= -1.048,XU DL= 0,XDEDL= 0
ZA DL=-4.011,ZADDL= 0,ZQ DL=0,ZU DL=0,ZDEDL=-1.146,
ZO DL=-.370
MO DL=.0038,MADL=-.464,MADDL=-3.5,MQ DL=-6.,
MU DL=0,MDEDL=-1.748
B  DL=19.4,AILDL=0,ZSPDL=.25
YB DL=-.573,YBDDL=0,YP DL=0,YR DL=0,YDRDL=.212
LDRDL=-.084,LB DL=-.264,LP DL=-.310,LFSDL=.0138,LBDDL=0,
LR DL=0
NDRDL=-.344,NFSDL=.00525,NB DL=.086,NBDDL=0,NP DL=0,
NR DL=-.140
LBRDL=1,YBRDL=1,NBRDL=1
ID1VA=3,IDGVA=6,S  VA=125,VS VA=230.,ALSVA=0
C1 MA1= -1.,C1 MA2=1,C2 MA2=0
P1 IO2=14.7,T1 IO2=520,SH1IO2=0
CO1IO2=0
GAXTG=1,GAYTG=0,GAZTG=0,XO TG=0,YO TG=0,ZO TG=-1.583
PW VA=0,QW1VA=0,RW1VA=0
C1 MA3=-1,AN FU2=1
TABLE,TPOIO2,2
0,1
0,10000
TABLE,A2TTB,2
0,50
0,0
TABLE,FTAFU,4
0,202.7,220,350
4.3,4.3,4.3,4.3
TABLE,A2TTA2,2
0,50
0,0
TABLE,B2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,C2TTA2,4
0,5,5.5,50
0,0,0,0
TABLE,D2TTA2,2
0,50
2700,2700
TABLE,A2TTA,2
0,50
-1,-1
TABLE,B2TTA,2
0,50
0,0
TABLE,C2TTA,2
0,50
0,0
TABLE,D2TTA,2
0,50
1,1
```

```
TABLE,XYZB,9
20.5,-126.2,3.7
20.5,126.2,3.7
-92.1,-126.2,3.7
-92.1,126.2,3.7
131.6,0,23.2
-128.2,0,15.9
TABLE,GAP,3
1,2,3
0,0,0
TABLE, ABLTK, 2
22,7,69.1,1
TABLE, XYZTK, 16
126.489,3.06,0,67.5
122.159,7.39,0,22.5
109.249,8,0,0
87.833,8,0,0
64.7,8,0,0
41.567,8,0,0
26.94,7.39,0,-22.5
22.61,3.06,0,-67.5
TABLE, DSMTK, 12
19.2,1,.2
19.2,1,.2
19.7,1,.2
23.133,1,.2
23.133,1,.2
23.133,1,.2
19.2,1,.2
19.2,1,.2
TABLE, IALTK, 16
1,.0266,31.55,10
1,.0266,31.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
1,.0266,34.55,10
TABLE, RELTK, 4
0,2,4,100
0,0,0,0
TABLE,FTAFU2,4
0,16.7,18.7,1000
0,0,0,0
TABLE,PR FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
1.4,1.16,1.159,1.158,1.157,1.154,1.14,1.09,1,1,1
1.4,1.09,1.08,1.07,1.027,1,1,1,1,1,1
TABLE,ET FR,11,2
351,241
.0155,15.51,155.13,310.3,465.4,519.7,620.5,775.63,892.,1086,1396
.01,.15,.35,.6,.76,.8,.8,.6,.01,.01,.01
.01,.05,.6,.7,.4,.01,.01,.01,.01,.01,.01
PARAMETER VALUES
EN FR=7.5,UA FR=1,TAMFR=520
TSWITCH=1.,FINMA T=0.,FINMA S=0,FINMA E=0,FINMA R=0
```

```
XTRDL=-.0176,MALDL=-.178,MTRDL=-.008,YTRDL=-.378,LTRDL=-.0811,
NTRDL=-.0456
PARAMETER VALUES
REARMU=.2,FRONTMU=.2,RVCRP=2.,RVSATP=4.,RVAREA=0.,KOUNT=1
AN FU=1
AMASS=228.4
ANRTK=0
 TK=0,H  TK=0
PA TK=14.7,WCUTK=0,TCUTK=520
NE TK=-8
CDGTK=.9,NSTTK=1,NPTTK=10
WLTTK=76,BSTTK=233.15
CD1TK=.6,CD2TK=.2,CDATK=.9
BSCTK=168.6,WLCTK=107.5,TAUTK=.005,VU TK=6.
AMOTK=0,DMPTK=.02,EPCTK=1
INITIAL CONDITIONS
P1 FR=14.7
PT TK=16.5,VT TK=110
PC TK=15.6,VC TK=60
U  SG=100,V  SG=0,W  SG=0
P  SG=0,Q  SG=0,R  SG=0
ROLSG=0,PITSG=0,YAWSG=0
X  SG=0,Y  SG=0,ALTSG=4.3
PRINT CONTROL=4
LINEAR ANALYSIS
NO STATES
INT CONTROL, PT TK=1,VT TK=1,PC TK=1,VC TK=1,W  SG=1,Q  SG=1,
   PITSG=1,ALTSG=1,P1 FR=1
STEADY STATE
XIC-X
PARAMETER VALUES,EN FR=5.5
STEADY STATE,XIC-X
PARAMETER VALUES,EN FR=5.75
STEADY STATE,XIC-X
PARAMETER VALUES,EN FR=6.0
STEADY STATE,XIC-X
PARAMETER VALUES, EN FR=6.25
STEADY STATE,XIC-X
PARAMETER VALUES,EN FR=6.5
STEADY STATE,XIC-X
PARAMETER VALUES,EN FR=6.75
STEADY STATE,XIC-X
PARAMETER VALUES,EN FR=7.0
STEADY STATE,XIC-X
PARAMETER VALUES,EN FR=7.25
STEADY STATE,XIC-X
PARAMETER VALUES,EN FR=7.5
STEADY STATE,XIC-X
PARAMETER VALUES, EN FR=7.75
STEADY STATE,XIC-X
PARAMETER VALUES,EN FR=8.0
STEADY STATE,XIC-X
INT CONTROL, U  SG=1,X  SG=1
PRINTER PLOTS
DISPLAY1
PITSG,VS,TIME
X  SG,VS,TIME
ALTSG,VS,TIME
```

```
U  SG,VS,TIME
W2 FR,VS,TIME
DISPLAY2
W  SG,VS,TIME
Q  SG,VS,TIME
VTOTAL,VS,TIME
AACCEL,VS,TIME
LACCEL,VS,TIME
DISPLAY3
PT TK,VS,TIME
VT TK,VS,TIME
PC TK,VS,TIME
VC TK,VS,TIME
PRATIO,VS,TIME
DISPLAY4
R17,VS,TIME
GAPLWF,VS,TIME
GAPLWR,VS,TIME
GAPFF,VS,TIME
GAPFR,VS,TIME
DISPLAY5
GAPCG,VS,TIME
TYTTK,VS,TIME
FXTTK,VS,TIME
FZTTK,VS,TIME
T2 FR,VS,TIME
DISPLAY6
ALTSG,VS,X  SG
FD MA E,VS,TIME
TINC=.02,TMAX=1,PRATE=1,INT MODE=5
PRINT CONTROL=3
TITLE=R-ARPV W/ACTS, TAKEOFF W/ 3 DOF LONGITUDINAL
PLOT ID = S.J.BAUMGARTNER,MS 41-47,655-5260
```

```
MODEL DESCRIPTION     ROCKWELL ELASTIC CUSHION TAKEOFF, FILE RTMCE1
ADD PARAMETERS=AMASS,RVCRP,RVSATP,RVAREA,FRONTMU,REARMU,KOUNT,
   KENERGY,PENERGY,TENERGY,PRATIO,VTOTAL,RELIEFA,AACCEL,LACCEL,
   GAPLWF,GAPRWF,GAPLWR,GAPRWR,GAPFF,GAPFR,GAPCG,CNT,TSWITCH
ADD TABLES=XYZB,21,GAP,9
ADD PARAMETERS=UW,VW,WW,RR,PP,YY,UW2,VW2,WW2
FORTRAN STATEMENTS
C
C          COMPONENT TA2 IS USED TO DEFINE WIND CONDITIONS DURING
C          TAKEOFF
C
LOCATION = 65      TA2
FORTRAN STATEMENTS
       UW=A2 TA2
       VW=B2 TA2
       WW=C2 TA2
       RR=ROLSG
       PP=PITSG
       YY=YAWSG
       UW2 =UW*(COS(PP)*COS(YY))+VW*(COS(PP)*SIN(YY))-WW*SIN(PP)
       VW2 =UW*(SIN(RR)*SIN(PP)*COS(YY)-COS(RR)*SIN(YY))
      1    +  VW*(SIN(RR)*SIN(PP)*SIN(YY)+COS(RR)*COS(YY))
      2    +  WW*(SIN(RR)*COS(PP))
       WW2 =UW*(COS(RR)*SIN(PP)*COS(YY)+SIN(RR)*SIN(YY))
      1    +  VW*(COS(RR)*SIN(PP)*SIN(YY)-SIN(RR)*COS(YY))
      2    +  WW*COS(RR)*COS(PP)
       UW VA=UW2
       VW VA=VW2
       WW VA=WW2
LOCATION=46     VA          INPUTS=SG
LOCATION=28     MA1         INPUTS=SG(PIT=FIN),VA(AL=C2)
FORTRAN STATEMENTS
       FINMA2 = VT VA*SIN(FO MA1*3.14159/180.)
       RPD = .01745324
       CALVA = COS(AL VA*RPD)
       SALVA = SIN(AL VA*RPD)
LOCATION=64     MA2
FORTRAN STATEMENTS
C
C          COMPONENT FU DEFINES THE DESIRED TAKEOFF
C          PATH AND COMPONENT MA3 CALCULATES THE ALTITUDE
C          ERROR OF THE AIRPLANE DURING TAKEOFF.
C
LOCATION = 59      FU       INPUTS=SG(U=FIN)
LOCATION = 67      MA3      INPUTS=SG(ALT=C2),FU(FO=FIN)
FORTRAN STATEMENTS
C  LOCATION = 72     OC
C  O.C. INPUTS = P  SG,Q  SG,R  SG,ROLSG,PITSG,YAWSG,U  SG,V  SG,W  SG,
C         X  SG,Y  SG,FO MA3,PT TS
C  O.C. OUTPUTS = FINMA S,FINMA E,FINMA R,WTRTS,BSTTS
C  FORTRAN STATEMENTS
C         IF (05 OC .GT. 258.15) 05 OC =258.15
C         IF (05 OC .LT. 228.15) 05 OC = 228.15
C         IF (04 OC .LT. 300.) 04 OC = 300.
C         IF (04 OC .GT. 900.) 04 OC = 900.
C         CPCG = 168.6 + 74.55 - 05 OC
C
C          COMPONENTS MA E, MA S, MA T, AND  MA R  COMBINE O.C. OUTPUT
```

```
C          COMMANDS TO THE CONTROL SURFACES WITH GROUND PILOT
C          COMMANDS. TABLE D2TTA IS USED AS A SWITCH TO SHUT OFF
C          THE OPTIMAL CONTROLLER.
C
LOCATION = 102     TA
LOCATION = 122     MA E    INPUTS=TA(A2=C2,D2=C1)
LOCATION = 124     MA S    INPUTS=TA(B2=C2,D2=C1)
LOCATION = 126     MA R    INPUTS=TA(C2=C2,D2=C1)
LOCATION = 128     MA T     INPUTS=TA2(D2=C2),TA(D2=C1)
LOCATION = 53     TB
LOCATION=73,FU3,INPUTS=SG(ALT=FIN)
LOCATION=74,FU4,INPUTS=SG(ALT=FIN)
LOCATION=75,FU5,INPUTS=SG(ALT=FIN)
LOCATION=76,FU6,INPUTS=SG(ALT=FIN)
LOCATION=77,FU7,INPUTS=SG(ALT=FIN)
LOCATION=78,FU8,INPUTS=SG(ALT=FIN)
LOCATION=79,FU9,INPUTS=SG(ALT=FIN)
FORTRAN STATEMENTS
       IF (FO MA E .GT. 20.) FO MA E = 20.
       IF (FO MA E .LT. -20.) FO MA E = -20.
       IF (FO MA T .LT. 600.) FO MA T = 600.
       IF (FO MA T .GT. 2700.) FO MA T = 2700.
       IF (TSWITCH .LT. .1) FO MA T = 0.
       TH TG = FO MA T
       SPOOL=A2 TB
       XTRDL=FO FU4
       MALOL=FO FU5
       MTROL=FO FU6
       YTRDL=FO FU7
       LTRDL=FO FU8
       NTRDL=FO FU9
LOCATION = 51     TG
LOCATION=2      OL          INPUTS=VA,TG
FORTRAN STATEMENTS
       IF (FO MA S .GT. 45.) FO MA S = 45.
       IF (FO MA S .LT. -45.) FO MA S = -45.
       IF (FO MA R .GT. 15.) FO MA R = 15.
       IF (FO MA R .LT. -15.) FO MA R = -15.
       FSPDL = FO MA S
       RUDDL = FO MA R
LOCATION=34     DL          INPUTS=VA,OL,TG
FORTRAN STATEMENTS
       IF (KOUNT .EQ. 1) WRITE(6,10) (RELTS(I),I=4,11),(DM TS(I),I=4,19),
     1   (FTAFU2(I),I=4,11)
   10 FORMAT(8E13.5)
       RELTS(5)=RVCRP
       RELTS(6)=RVSATP
       RELTS(10)=RELTS(11)=RVAREA
       DM TS(5)=DM TS(7)=DM TS(9)=FRONTMU
       DM TS(11)=DM TS(13)=DM TS(15)=DM TS(17)=REARMU
       DM TS(19)=REARMU
       FTAFU2(5)=14.7*RVCRP
       FTAFU2(6)=14.7*RVSATP
       FTAFU2(10)=FTAFU2(11)=RVAREA
       P2 I02 = P1 FR
LOCATION=174     I02
LOCATION=172     FR     INPUTS=TS(PT=P,2),I02(2=1)
FORTRAN STATEMENTS
```

```
      IF(ALTSG.LE.100)WTRTS=W2 FR*2.
      IF(ALTSG.GT.100)WTRTS=0
LOCATION=142    TS    INPUTS=SG,FR(T,2=TTR)
LOCATION = 166     FU2     INPUTS=TS(PT=FIN)
FORTRAN STATEMENTS
      RELIEFA = FO FU2
      PRATIO=(PC TS-PA TS)/(PT TS-PA TS)
      FX1S3 = 0
      FY1S3 = 0
      FZ1S3 = 0
      TX1S3 = 0
      TY1S3 = 0
      TZ1S3 = 0
LOCATION=16    S3
INPUTS=TS(FXT=FX,2,FYT=FY,2,FZT=FZ,2,TXT=TX,2,TYT=TY,2,TZT=TZ,2)
INPUTS=DL(2=3),OL(2=3)
FORTRAN STATEMENTS
      UD SG=FX+S3/AMASS-(Q  SG*W  SG-R  SG*V  SG)*.01745-
     1       32.2*SIN(PITSG*.01745)
      VD SG=FY+S3/AMASS-(R  SG*U  SG-P  SG*W  SG)*.01745+
     1       32.2*COS(PITSG*.01745)*SIN(ROLSG*.01745)
      WD SG=FZ+S3/AMASS-(P  SG*V  SG-Q  SG*U  SG)*.01745+
     1       32.2*COS(PITSG*.01745)*COS(ROLSG*.01745)
LOCATION=10    SG    INPUTS=S3(TX,4=TX,TY,4=TY,TZ,4=TZ)
FORTRAN STATEMENTS
      KENERGY=.5*AMASS*(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
     1  +.5*(IXXSG*P  SG*P  SG+IYYSG*Q  SG*Q  SG+IZZSG*R  SG*R  SG
     2  + IXZSG*P  SG*R  SG)
      PENERGY= (PT TS-PA TS)*VT TS*144. + (PC TS-PA TS)*VC TS*144.
     1   + AMASS*32.2*ALTSG
      TENERGY= KENERGY+PENERGY
      KOUNT=KOUNT+1
      AACCEL=SQRT(PD SG*PD SG+QD SG*QD SG+RD SG*RD SG)
      LACCEL= (SQRT(UD SG*UD SG+VD SG*VD SG+WD SG*WD SG))/32.2
      VTOTAL=SQRT(U  SG*U  SG+V  SG*V  SG+W  SG*W  SG)
      IF(VTOTAL.LT.250.AND.ALTSG.LT.10)ELEDL=0
      IF(VTOTAL.GE.250.AND.ALTSG.LT.10)ELEDL=-6
      IF(ALTSG.GE.10)ELEDL=FO FU3
      CNT=0.
   20 CNT=CNT+1.
      I=CNT+.001
      IF (I .GT.1) GAP(I+2) = ALTSG*12. +W2 TR
      U1 TR=XYZB(3*I+1)
      V1 TR=XYZB(3*I+2)
      W1 TR=XYZB(3*I+3)
      ROLTR=ROLSG
      PITTR=PITSG
      YAWTR=YAWSG
LOCATION = 110     TR
FORTRAN STATEMENTS
      IF (CNT .LT. 6.) GO TO 20
      GAP(9)=ALTSG*12.+W2 TR
      GAPLWF=GAP(4)
      GAPRWF=GAP(5)
      GAPLWR=GAP(6)
      GAPRWR=GAP(7)
      GAPFF =GAP(8)
      GAPFR =GAP(9)
```


*U.S.Government Printing Office: 1979 — 657-002/199