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Produced by the NASA Center for Aerospace Information (CASI)
A Survey of Electric and Hybrid Vehicle Simulation Programs

Volume II: Questionnaire Responses

J. Bevan
D. A. Heimburger
M. A. Metcalfe

July 1, 1978

National Aeronautics and Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

(JPL PUBLICATION 78-58, Volume II)
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PREFACE

Two Appendixes, D and E, are combined in this volume of JPL Publication 78-58. These two Appendixes present the questionnaires received as a result of the study survey, along with additional material sent by the respondents. The material is presented in combined form (i.e., the additional material along with the questionnaire) for ease of reference. Appendixes A, B, and C of this report are contained in Volume I.

To eliminate unnecessary material, questionnaire pages that did not contain answers have been removed.

ABSTRACT

This volume presents the data received in a survey conducted within the United States to determine the extent of development and capabilities of automotive performance simulation programs suitable for electric and hybrid vehicle studies. The survey was conducted for the Department of Energy by NASA's Jet Propulsion Laboratory in support of Public Law 94-413, the Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976. Volume I of this report summarizes and discusses the results contained in Volume II.
Please provide the following information:

Your name ____________________________ R.L. Gradishar.

Your company __________________________ Advanced Kinetics, Inc.

Your company address ____________________ 1231 Victoria St.

______________________________________

Costa Mesa, Calif. 92627

______________________________________

Your mail stop ____________________________

Your department __________________________

Your title __________________________ Secretary-Treasurer.

Your phone number ________________________

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes Name of Program(s) __________________________
   □ No

3. Please list program names which are in a usable state.

   ______________________________________
   ______________________________________
   ______________________________________
   ______________________________________
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes Who? ___________________________________________
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   ____________________________________________
   ____________________________________________
   ____________________________________________
SPEED MESSAGE

TO MR. O. FIGUEROA - SUPERVISOR
FROM ORDEAN KILTIE - Advisory
FLIGHT PROJECTS/ CIVIL SYSTEMS
MAIL STOP 125-241 - JPL
SUBJECT 4800 OAK GROVE DR - PASADENA - 91103

DATE 18 NOV 1977

DEAR MR. FIGUEROA,

THIS MESSAGE IS WITH REGARD TO YOUR INQUIRY OF AUTOMOTIVE-PERFORMANCE SIMULATION PROGRAM.

I HAVE NO SIMULATION PROGRAM. ON AUGUST 29 I AM ACCOMPANYING MR. J. R. HARKNESS, VICE PRESIDENT OF BRIGGS AND STRATTON CO., MILWAUKEE, WI TO REVIEW AND DISCUSS THEIR NEWLY DEVELOPED 11 HP AND 16 HP GASOLINE ENGINES SUITABLE FOR HYBRID ELECTRIC VEHICLES WITH YOUR MR. FRANK SURBER, MR. NOEL SANDBERG, TOM BARBER AND OTHERS.

SINCE I PREFER TO NOT COMMIT BRIGGS AND STRATTON
I AM MAILING YOUR LETTER AND QUESTIONNAIRE TO MR. J. R. HARKNESS.

I DO THANK YOU.

SINCERELY

SIGNED ORDEAN KILTIE
Please provide the following information:

Your name  

Architects' firms  

Your company address  

Your mail stop  

Your department  

Your title  

Your phone number  

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes  Name of Program(s) 
   - No

3. Please list program names which are in a usable state,
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name **EVELYN L. VEEDER**
Your company **AVUS CORPORATION**
Your company address **4 Research Place**
**Rockville, MD 20850**

Your mail stop **NA**
Your department **Federal Government Operations**
Your title **Proposal Coordinator**
Your phone number **301-948-7010**

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes
   - Name of Program(s)
   - No

3. Please list program names which are in a usable state.
   **NONE**

---

   5
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  **HOWARD J. REID**
Your company **MELCON SYSTEMS DESIGN CONSULTANTS**
Your company address  **1200 QUAIL ST.**  
                        **NEWPORT BEACH, CA, 92660**

Your mail stop ____________________________________________________________
Your department __________________________________________________________
Your title  **CONSULTANT**
Your phone number  **(714) 752 8636**

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes  Name of Program(s) _______________________________________________
   - No

3. Please list program names which are in a usable state,
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other__________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes Who? _________________________
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   - [ ] NONE
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
Please provide the following information:

Your name  ERWIN A. ULRICH

Your company  CREATIVE AUTOMOTIVE RESEARCH DIVISION

Your company address  TWENTY FIRST CENTURY ELECTRIC VEHICLES INC.

8136 BYRON RD.

WHITTIER CA 90606

Your mail stop  BLDG. C7

Your department  NONE

Your title  CHIEF ENGINEER

Your phone number  213-593-1246 HOME 213-696-4886

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

   □ Yes  Name of Program(s)  BATTERY TEST PROGRAM

   □ No

3. Please list program names which are in a usable state.

   1. BATTERY TEST PROGRAM (ANALOG)
   2. DUAL MODE AUTOMOBILE SIMULATION (DIGITAL)
4. Is your program(s) available for public use?

☐ Yes
☒ No

5. Is the program(s) described in any publicly available technical publications?

☐ Yes
☒ No

6. Can your simulation program in some manner simulate or predict performance of:

☐ Heat-engine vehicles
☒ Electric vehicles
☐ Hybrid vehicles
☐ All of the above
☐ None of the above

(Please define your meaning of "Hybrid".)

Two Torque Sources
In Series or Parallel — Modular Construction

7. Please describe your program(s) in terms of:

- The programming language used
  1. ANALOG
  2. CSSL III

- The computer(s) it runs on
  2. CDC 6500

- The approximate number of source code cards
  2. 1,000

- The approximate number of routines
  2. 20

- Core storage requirements
  2. NOT LARGE (80K to 100K)

8. Your simulation program(s) is:

☐ Well documented FOR ENGINEER-USERS
☒ Partially documented FOR OPERATORS
☐ Not too well documented per conversation with Mr. Ulbrich on 3/22/78.

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?

☐ Yes
☒ No

Could be easily added
10. Is your simulation program(s) designed for:
   - Batch mode operation (LINE PRINTER PLOTTING)
   - Interactive mode
   - Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - EPA urban
   - EPA highway
   - Some or all SAE J227 schedules
   - Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - Yes
   - No
   - Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - Yes
   - No
   - Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - Yes
   - No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   - TOO MANY TO LIST
Please provide the following information:

Your name: David Yancey
Your company: Clark County Transportation Study
Your company address: P.O. Box 396
Las Vegas, Nevada 89101

Your mail stop: our office
Your department: Regional Street and Highway Commission
Your title: Principle Planner
Your phone number: (702) 386-4071, X-484

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes
     Name of Program(s):
     __________________________________________
   - [ ] No

3. Please list program names which are in a usable state,
   __________________________________________
   __________________________________________
   __________________________________________
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes  Who?
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

This Clark County Transportation Study is responsible for studying and implementing/developing a transportation system for Clark County to provide for an efficient and balanced transportation system to adequately provide for the mobility needs of the community as it evolves within the desired development patterns.
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ________________ FRANK VERBEKE
Your company ________________ ALTURDYNE
Your company address ________________ 8050 Armour
SAN DIEGO, CALIF 92111

Your mail stop ____________________________
Your department ____________________________
Your title ________________________________ PRESIDENT
Your phone number ________________ 714-565-2131

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes Name of Program(s) ____________________________
   □ No

3. Please list program names which are in a usable state.
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________

13
10. Is your simulation program(s) designed for:
   [ ] Batch mode operation
   [ ] Interactive mode
   [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   [ ] EPA urban
   [ ] EPA highway
   [ ] Some or all SAE J227 schedules
   [ ] Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   [ ] Yes
   [ ] No
   [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   [ ] Yes
   [ ] No
   [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [ ] Yes Who? ____________________________
   [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   We're just getting started with our own model of a battery-gas turbine vehicle.

   [Signature]
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: B. H. Rowlett
Your company: Air research Mfg Co
Your company address: 2525 W. 190th St
TORRANCE CALIF 90509

Your mail stop
Your department: 93-8
Your title: Program Mer
Your phone number: (213) 323-9500 X 3638

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - ❑ All government funding
   - ☐ Some government funding
   - ☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - ☑ Yes Name of Program(s) DOE Contract "Near Term Electric Vehicle"
   - ☐ No

3. Please list program names which are in a usable state,

   WING-12
   EVNMTR
   LA4NEW

15
4. Is your program(s) available for public use?
   ☐ Yes
   ☒ No

5. Is the program(s) described in any publicly available technical publications?
   ☒ Yes
   ☐ No

6. Can your simulation program in some manner simulate or predict performance of:
   ☐ Heat-engine vehicles
   ☒ Electric vehicles
   ☐ Hybrid vehicles
   ☐ All of the above
   ☐ None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   The programming language used
   ☐ FORTRAN
   ☐ Other

   The computer(s) it runs on
   ☐ UNIVAC 1100
   ☐ Other

   The approximate number of source code cards
   ☐ 2,500 each
   ☐ Other

   The approximate number of routines
   ☐ 10 each
   ☐ Other

   Core storage requirements
   ☐ 20 blocks each
   ☐ Other

8. Your simulation program(s) is:
   ☐ Well documented
   ☐ Partially documented
   ☒ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   ☐ Yes
   ☐ No
   ☐ Other

   16
10. Is your simulation program(s) designed for:
   - Batch mode operation
   - Interactive mode
   - Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - EPA urban
   - EPA highway
   - Some or all SAE J227 schedules
   - Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - Yes
   - No
   - Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - Yes
   - No
   - Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - Yes Who? Tom Barber, Ron Yoshida
   - No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
Please provide the following information:

Your name: Roy Kaylor

Your company: Kaylor Energy Products

Your company address: 1918 Menalto Ave

Menlo Park, Calif

94025

Your mail stop

Your department

Your title: President

Your phone number: (415) 325-6900

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [X] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [X] Yes
   - [ ] No

3. Please list program names which are in a usable state.

   Electric

   Electric

   Electric

18
4. Is your program(s) available for public use?
   - [ ] Yes
   - [ ] No

5. Is the program(s) described in any publicly available technical publications?
   - [ ] Yes
   - [ ] No

6. Can your simulation program in some manner simulate or predict performance of:
   - [ ] Heat-engine vehicles
   - [X] Electric vehicles
   - [X] Hybrid vehicles
   - [ ] All of the above
   - [ ] None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   - The programming language used: [ ] Basic
   - The computer(s) it runs on: [ ] Small
   - The approximate number of source code cards: [ ]
   - The approximate number of routines: [ ]
   - Core storage requirements: [ ]

8. Your simulation program(s) is:
   - [ ] Well documented
   - [ ] Partially documented
   - [ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - [ ] Yes
   - [X] No
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other __________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - [X] Yes \textit{per conversation with Mr. Kaylor on 2/7/78}
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes \textit{Who? ____________________________}
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   ____________________________
   ____________________________
   ____________________________
   ____________________________

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: JOHN BRENNAN
Your company: GRC
Your company address: P.O. Box 3587
S.B. CA 93105
Your mail stop: 
Your department: 
Your title: MEMBER OF TECH. STAFF
Your phone number: 805 964 1724

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [X] Yes
   - [ ] No

3. Please list program names which are in a usable state.
   - FLVEC
   - [ ]
   - [ ]
   - [ ]
   - [ ]

21
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

(Please define your meaning of "Hybrid"). Heat engine/battery electric

7. Please describe your program(s) in terms of:
   - The programming language used: FORTRAN
   - The computer(s) it runs on: IBM, UNIVAC, CDC
   - The approximate number of source code cards: 5000
   - The approximate number of routines: 50
   - Core storage requirements: ~220000 BYTES

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
10. Is your simulation program(s) designed for:
   [ ] Batch mode operation
   [ ] Interactive mode
   [X] Both of the above

11. If your simulation(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   [X] EPA urban
   [X] EPA highway
   [ ] Some or all SAE J227 schedules (incl. SAE Metro & European FAICRA)
   [X] Other (Constant speed + European FAICRA)

12. Can JPL use this data in a survey report for the Department of Energy?
   [X] Yes
   [ ] No
   [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   [X] Yes
   [ ] No
   [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [X] Yes Who? Phil Chapman
   [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   

   

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  

WALTER-H.-KORFF

Your company  

KORFF CORP.

Your company address  

449 N. LAMER ST.

BURBANK CALIF. 91506

Your mail stop  

Your department  

Your title  

PRES. & GEN. MGR.

Your phone number  

(213) 848-2539

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes  Name of Program(s)

☐ No

3. Please list program names which are in a usable state.

NONE


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Please provide the following information:

Your name  

Your company  

Your company address  

Your mail stop  

Your department  

Your title  

Your phone number  

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes  Name of Program(s)  
   - [ ] No

3. Please list program names which are in a usable state,
10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   □ Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   □ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes Who?________________________
   □ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   ____________________________________________________________
   ____________________________________________________________
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  H. Reese Ivey

Your company Wood-Ivey Systems Corp. 

Your company address  P.O. Box 4609

Winter Park, FL. 32793

Your mail stop

Your department

Your title  Vice President

Your phone number  (305) 678-6116

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes  Name of Program(s) ____________________________________________

☐ No

3. Please list program names which are in a usable state,

________________________________________________________

________________________________________________________

________________________________________________________

27
10. Is your simulation program(s) designed for:
   [ ] Batch mode operation
   [ ] Interactive mode
   [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   [ ] EPA urban
   [ ] EPA highway
   [ ] Some or all SAE J227 schedules
   [ ] Other ________________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   [ ] Yes
   [ ] No
   [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   [ ] Yes
   [ ] No
   [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [ ] Yes   Who? ___________________________________
   [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
    The major automotive companies ________________________________
    ________________________________
Electric Dynamics Corporation
Attn: James C. Boylan
President
607 North Main Street
Plainwell, MI 49080

Dear Sir:

The Jet Propulsion Laboratory (JPL) has been requested by the Department of Energy to conduct a survey of automotive-performance simulation capability within the United States and, in particular, electric and hybrid vehicle performance simulation capability within the industry and government sectors. The results will be published and made available to the public.

Attached is a questionnaire designed to give JPL a brief indication of your automotive performance simulation capability. The questions are yes/no or multiple-choice types which will convey information to JPL with a minimum expenditure of your time. The questionnaire should require approximately 10 minutes to complete.

Please help us by indicating your answers to the questions and returning the questionnaire in the self-addressed, stamped envelope provided. Your prompt response will be greatly appreciated.

It is emphasized that this is a request for information only and does not constitute a commitment, implied or otherwise, that JPL will take any procurement action. JPL or the Government cannot be responsible for any cost incurred in furnishing this information.

Very truly yours,

O. Figueroa, Supervisor
Flight Project &
Civil Systems
Procurements

PD: cm

enclosure
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ____________________________ 

Your company ____________________________ 

Your company address ____________________________ 

Your mail stop ____________________________ 

Your department ____________________________ 

Your title ____________________________ 

Your phone number ____________________________ 

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

□ All government funding
□ Some government funding
□ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

□ Yes Name of Program(s) ____________
□ No

3. Please list program names which are in a usable state,

______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________

30
4. Is your program(s) available for public use?
   □ Yes
   □ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   □ All of the above
   □ None of the above

   (Please define your meaning of "Hybrid").

   Gasoline + Diesel + Electric in series or parallel configuration

7. Please describe your program(s) in terms of:
   The programming language used _______ Basic
   The computer(s) it runs on _______ BCC, PDP 11
   The approximate number of source code cards _______
   The approximate number of routines _______
   Core storage requirements _______

8. Your simulation program(s) is:
   □ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   □ Yes
   □ No - at present
   □ 31
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☐ Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?

☐ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☐ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes  Who? ____________________________
☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

PRIDIO SERVICES  DEARBORN MICH
GE
32
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name Arthur E. Raynard

Your company AiResearch Manufacturing Company

Your company address 2525 West 190th Street

Torrance, California 90509

Your mail stop T-41 Building 36

Your department 93-8

Your title Senior Project Engineer

Your phone number (213) 323-9500 x-2881

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☒ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☒ Yes Name of Program(s) Preparing for upcoming Hybrid Vehicle Program

☐ No

3. Please list program names which are in a usable state.

1. Hybrid Vehicle Performance Program

2. Hybrid Vehicle Life Cycle Cost Program

33
4. Is your program(s) available for public use?
   □ Yes
   □ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   □ All of the above
   □ None of the above

(Please define your meaning of "Hybrid"). Vehicle uses two fuel sources, one of which is wall plug electricity and storable in the vehicle.

7. Please describe your program(s) in terms of:
   The programming language used Fortran V
   The computer(s) it runs on UNIVAC - 1100
   The approximate number of source code cards Performance - 1500; Cost - 500
   The approximate number of routines 15
   Core storage requirements Performance - 20K words

8. Your simulation program(s) is:
   □ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   □ Yes
   □ No
10. Is your simulation program(s) designed for:

- ☑ Batch mode operation
- ☐ Interactive mode
- ☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

- ☑ EPA urban
- ☑ EPA highway
- ☑ Some or all SAE J227 schedules
- ☐ Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?

- ☑ Yes
- ☐ No
- ☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

- ☑ Yes
- ☐ No
- ☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

- ☐ Yes Who? ____________________________
- ☑ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   University of Wisconsin, TRW, Aerospace Corp., Ford Motor Co., LLL, Exxon
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  Bogdan W. Bernert

Your company  B. I. E. - BERNERT INTERNATIONAL ENGINEERS

Your company address  7615 Greenback Lane
                      Citrus Heights, CA 95610

Your mail stop

Your department

Your title  President

Your phone number  (916) 726-0450

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   
   □ Yes  Name of Program(s)
   □ No

3. Please list program names which are in a usable state.

   

   

   

   

   

   

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10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other ________________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes  Who? ________________________________
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   We do not know any U.S. companies to be engaged in automotive performance simulation program.
Please provide the following information:

Your name: Robert S. McKee
Your company: McKee Engineering Corp.
Your company address: 411 W. Colfax St., Palatine, Ill. 60067

Your mail stop: ________________________________
Your department: ________________________________
Your title: President
Your phone number: 312-358-6773

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes  Name of Program(s): ________________________________
   - [ ] No

3. Please list program names which are in a usable state.
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

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Mr. O. Figueroa  
Flight Project and Civil Systems Procurements  
Jet Propulsion Laboratory  
4800 Oak Grove Dr.  
Pasadena, Ca  91103  

November 22, 1977

Dear Sir:

With regard to the recent request from your office concerning Vehicle Simulation Programs: we are currently seeking support for the development of Vehicle Simulation and Parameter Identification software. We have significant in-house experience and capability in this field and we would appreciate information concerning the procedure for qualifying our company so that we can receive RFP'S and submit proposals in this general area.

Very truly yours,

Robert S. McKee  
President  
RSM/rr
Please provide the following information:

Your name: M.A. POCOBELLI

Your company: TRIAD SERVICES, INC

Your company address: 10611 HAMMOND ST
DEARBORN, MICH. 48126

Your mail stop

Your department

Your title: PRESIDENT

Your phone number: 313-584-075

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [X] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [X] Yes
   - [ ] No

3. Please list program names which are in a usable state,

   EV RANGE
   EV PERF
   EVSEC
   EVSEP

   Electric Vehicle Design

   ACCEL
   ACCEL A
   RACE

40
4. Is your program(s) available for public use?
   - No

5. Is the program(s) described in any publicly available technical publications?
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

(Please define your meaning of "Hybrid".)

7. Please describe your program(s) in terms of:
   - The programming language used: BASIC, FORTRAN
   - The computer(s) it runs on: 
   - The approximate number of source code cards:
   - The approximate number of routines:
   - Core storage requirements:

8. Your simulation program(s) is:
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - No
10. Is your simulation program(s) designed for:
   - Batch mode operation
   - Interactive mode
   - Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - EPA urban
   - EPA highway
   - Some or all SAE J227 schedules
   - Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - Yes
   - No
   - Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - Yes
   - No
   - Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - Yes
   - No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

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VEHICLE
SIMULATION
QUESTIONNAIRE

Please provide the following information:

Your name: AUGUST G. HEBEL JR
Your company: Bonac Corporation
Your company address: 1257 - 18th St.
Detroit, Michigan 48216

Your mail stop: SAME
Your department: PRACTICAL RESEARCH
Your title: CHAIRMAN - CHIEF EXECUTIVE OFFicer
Your phone number: (313) 496-1740

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [x] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [x] Yes Name of Program(s) HYBRID POWER
   - [ ] No

3. Please list program names which are in a usable state,
   NONE - MORE RESEARCH IS REQUIRED

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4. Is your program(s) available for public use?
   
   □ Yes
   □ No

5. Is the program(s) described in any publicly available technical publications?
   
   □ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles (For the future)
   □ All of the above
   □ None of the above

   (Please define your meaning of "Hybrid").

   On board generator driving an electric variable power concept.

7. Please describe your program(s) in terms of:
   
   The programming language used
   The computer(s) it runs on
   The approximate number of source code cards
   The approximate number of routines
   Core storage requirements MINIMAL

8. Your simulation program(s) is:
   
   □ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   
   □ Yes
   □ No

   Needs more development
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [x] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [x] Other (Our ideas are not in use today under any schedules)

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes
   - [x] No
   - [x] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [x] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes Who?
   - [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
    - Williams Research - Walled Lake, Michigan
    - American Motors - Southfield, Michigan

- 45
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ROBERT SCHWARZ

Your company SOUTH COAST TECHNOLOGY

Your company address P.O. BOX 3265

SANTA BARBARA, CA, 93105

Your mail stop

Your department

Your title DIRECTOR OF ENGINEERING

Your phone number (805) 964-4749

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [x] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s)
   - [x] No (BUT EXPECT TO BE SHORTLY)

3. Please list program names which are in a usable state.
   VIRCOM
   EV227


46
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   - The programming language used: FORTRAN IV
   - The computer(s) it runs on: G.E. TYNSHARE SYSTEM
   - The approximate number of source code cards
   - The approximate number of routines
   - Core storage requirements

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
10. Is your simulation program(s) designed for:
   [ ] Batch mode operation
   [x] Interactive mode
   [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   [ ] EPA urban
   [ ] EPA highway
   [ ] Some or all SAE J227 schedules
   [x] Other. [VROOM WILL ACCEPT ANY DRIVING CYCLE INPUT.]
   [ ] EPV 227 USES SAE J227 (D) CYCLE.

12. Can JPL use this data in a survey report for the Department of Energy?
   [x] Yes
   [ ] No
   [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   [x] Yes
   [ ] No
   [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [ ] Yes
   [ ] Who? ____________________________
   [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   ______________________________________
   ______________________________________
   ______________________________________

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: GEORGE H. GELB
Your company: TRW SYSTEMS AND ENERGY
Your company address: ONE SPACE PARK
REDONDO BEACH, CA.
90278
Your mail stop: R1/1086
Your department: ADVANCED TECHNOLOGY LABORATORY
Your title: MGR. ENERGY APPLICATIONS
Your phone number: (213) - 535-2500

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [X] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s)
   - [X] No

3. Please list program names which are in a usable state.
   NONE
4. Is your program(s) available for public use?
   □ Yes
   ☑ No

5. Is the program(s) described in any publicly available technical publications?
   ☑ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   ☑ Electric vehicles
   ☑ Hybrid vehicles
   □ All of the above
   □ None of the above

(Please define your meaning of "Hybrid".) Heat engine/stored energy source of either parallel or series types.

7. Please describe your program(s) in terms of:
   The programming language used: Online System
   The computer(s) it runs on: IBM 360-75
   The approximate number of source code cards
   The approximate number of routines
   Core storage requirements

8. Your simulation program(s) is:
   □ Well documented
   ☑ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   ☑ Yes
   □ No
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [x] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [x] Other_ PROGRAM ACCEPTS STATISTICAL DISTRIBUTIONS OF VEHICLE VELOCITY-ACCELERATION EVENTS

12. Can JPL use this data in a survey report for the Department of Energy?
   - [x] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [x] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes Who?
   - [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ________________________________
Your company ______________________________
Your company address _______________________
Your mail stop _____________________________
Your department ____________________________
Your title _________________________________
Your phone number __________________________

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - X All government funding
   - [] Some government funding
   - [] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - X Yes Name of Program(s) Auto Tech Assess
   - [] No

3. Please list program names which are in a usable state.


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4. Is your program(s) available for public use?
   ☑ Yes
   ☐ No

5. Is the program(s) described in any publicly available technical publications?
   ☑ Yes
   ☐ No

6. Can your simulation program in some manner simulate or predict performance of:
   ☑ Heat-engine vehicles
   ☐ Electric vehicles
   ☐ Hybrid vehicles
   ☐ All of the above
   ☐ None of the above

   (Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   The programming language used   FORTRAN / HPL
   The computer(s) it runs on   HP 2100 / HP 9825
   The approximate number of source code cards  500
   The approximate number of routines  3
   Core storage requirements  16 K

8. Your simulation program(s) is:
   ☑ Well documented
   ☐ Partially documented
   ☑ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   ☑ Yes
   ☐ No
10. Is your simulation program(s) designed for:
   - [x] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [x] EPA urban
   - [x] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [x] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [x] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes Who?
   - [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   - Gen Fomes
   - Ford

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Please provide the following information:

Your name  

Your company  

Your company address 

Your mail stop 

Your department  

Your title  

Your phone number  

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes  
   - No

3. Please list program names which are in a usable state.

55
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☐ Other__________________________

12. Can JPL use this data in a survey report for the Department of Energy?

☐ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☐ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes Who?_____________________________
☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

NONE TO MY KNOWLEDGE

__________________________________________

__________________________________________

__________________________________________

__________________________________________

56
Electric Vehicles of Ohio
Attn: Robert D. Childs
9135 Frenwood Drive
Olmsted Falls, OH 44138

Dear Sir:

The Jet Propulsion Laboratory (JPL) has been requested by the Department of Energy to conduct a survey of automotive-performance simulation capability within the United States and, in particular, electric and hybrid vehicle performance simulation capability within the industry and government sectors. The results will be published and made available to the public.

Attached is a questionnaire designed to give JPL a brief indication of your automotive performance simulation capability. The questions are yes/no or multiple-choice types which will convey information to JPL with a minimum expenditure of your time. The questionnaire should require approximately 10 minutes to complete.

Please help us by indicating your answers to the questions and returning the questionnaire in the self-addressed, stamped envelope provided. Your prompt response will be greatly appreciated.

It is emphasized that this is a request for information only and does not constitute a commitment, implied or otherwise, that JPL will take any procurement action. JPL or the Government cannot be responsible for any cost incurred in furnishing this information.

Very truly yours,

O. Figueroa, Supervisor
Flight/Project &
Civil Systems
Procurements

PD:cm

enclosure

57
Please provide the following information:

Your name ___________________________ Elmo M. Long

Your company ________________________ St. Elmo Hybrids

Your company address __________________ 1048 Van de Venter Street
                                             W. Palm Beach, Florida 33405

Your mail stop _________________________

Your department ________________________

Your title _____________________________ Director

Your phone number _____________________ (305) 832-6986

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   
   □ Yes   Name of Program(s) ____________________________
   □ No

3. Please list program names which are in a usable state,
   
   __________________________________________
   __________________________________________
   __________________________________________
   ____________________________
   ____________________________
   ____________________________
10. Is your simulation program(s) designed for:
   ❑ Batch mode operation
   ❑ Interactive mode
   ❑ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   ❑ EPA urban
   ❑ EPA highway
   ❑ Some or all SAE J227 schedules
   ❑ Other

12. Can JPL use this data in a survey report for the Department of Energy?
   ❑ Yes
   ❑ No
   ❑ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   ❑ Yes
   ❑ No
   ❑ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   ❑ Yes Who?________________________________________________________
   ❑ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   None.
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ____________ Edward A Campbell

Your company __________ Electric Vehicle Council

Your company address __________ 90 Park Avenue

________________________________________________________________________

New York, N Y 10016

________________________________________________________________________

Your mail stop

Your department

Your title __________ Executive Secretary

Your phone number __________ 212/573-8785

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes Name of Program(s) ____________________________

☐ No

3. Please list program names which are in a usable state,

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☐ Other______________________________

12. Can JPL use this data in a survey report for the Department of Energy?

☐ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☐ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes  Who? __________________________
☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

______________________________

None

61
Please provide the following information:

Your name__________________________________________________________

Your company________________________________________________________

Your company address__________________________________________________

Your mail stop_________________________________________________________

Your department________________________________________________________

Your title______________________________________________________________

Your phone number 201-575-2200

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s)_________________________________________
   - [ ] No

3. Please list program names which are in a usable state,

   _________________________________________________________________
   _________________________________________________________________
   _________________________________________________________________

   62
10. Is your simulation program(s) designed for:

- [ ] Batch mode operation
- [ ] Interactive mode
- [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

- [ ] EPA urban
- [ ] EPA highway
- [ ] Some or all SAE J227 schedules
- [ ] Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?

- [ ] Yes
- [ ] No
- [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

- [ ] Yes
- [ ] No
- [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

- [ ] Yes  Who? __________________________
- [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

DO NOT KNOW OF ANY - BUT WE ARE VERY INTERESTED IN BECOMING INVOLVED IN THIS WORK.

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  

Your company  Exxon Enterprises Inc.

Your company address  

PO Box 192
Florence Park
New Jersey 07932

Your mail stop

Your department  Electric Power Conversion Systems

Your title  Project Manager

Your phone number  201 414 5214

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding
☐ Some government funding
☒ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes  Name of Program(s)  

☐ No

3. Please list program names which are in a usable state,

EVSIM. FORT
ACCSIM. FORT

64
4. Is your program(s) available for public use?
   [ ] Yes
   [x] No

5. Is the program(s) described in any publicly available technical publications?
   [x] Yes  SAE PAPER 2/78
   [ ] No

6. Can your simulation program in some manner simulate or predict performance of:
   [ ] Heat-engine vehicles
   [x] Electric vehicles
   [ ] Hybrid vehicles
   [ ] All of the above
   [ ] None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   The programming language used  **FORTRAN**
   The computer(s) it runs on  **IBM 370**
   The approximate number of source code cards  **1100**
   The approximate number of routines  **15**
   Core storage requirements  **80 000 BYTES**

8. Your simulation program(s) is:
   [ ] Well documented
   [ ] Partially documented
   [ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   [ ] Yes
   [x] No

   65
10. Is your simulation program(s) designed for:

[ ] Batch mode operation
[ ] Interactive mode
[ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

[ ] EPA urban
[ ] EPA highway
[ ] Some or all SAE J227 schedules
[ ] Other  **SCOTT, SAE J1082**

12. Can JPL use this data in a survey report for the Department of Energy?

[ ] Yes  per conversation with Mr. Ricci on 2/9/78.
[ ] No
[ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

[ ] Yes
[ ] No
[ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

[ ] Yes  Who?
[ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ____________________________ C. A. Beisterling, Mgr., E.E.
Franklin Institute Research Labs.
Ben Franklin Parkway
Philadelphia, PA 19103

Your company ____________________________ ______________________________________

Your company address __________________________________________________________
____________________________________

Your mail stop _____________________________________________________________

Your department _____________________________________________________________

Your title _________________________________________________________________

Your phone number (215) 448 1235

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   ✔ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes Name of Program(s) Tunnel Entrance Safety
   □ No

3. Please list program names which are in a usable state.
   Hybrid system — no program names
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid"): Electric - Internal Combustion - Flywheel.

7. Please describe your program(s) in terms of:
   - The programming language used: Fortran and Assembly Language
   - The computer(s) it runs on: EAI Pacer 100 digital - General purpose analog
   - The approximate number of source code cards: None.
   - The approximate number of routines: Seven.
   - Core storage requirements: 60 K

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
   - 68
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other: ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes
   - [ ] No
   - [ ] Who? ____________________________________________

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   - None

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Please provide the following information:

Your name: Antonio F. Artiles

Your company: Mechanical Technology Inc.

Your company address: 968 Albany Shaker Rd.

Latham, N.Y. 12110

Your mail stop: 

Your department: Engineering Dept., R & D. Division

Your title: Analytical Engineer

Your phone number: 518-785-2435

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes Name of Program(s): 
   - No

3. Please list program names which are in a usable state.
   1. Hybrid
   2. Automobile Performance Simulation Program
4. Is your program(s) available for public use?
   □ Yes
   ✔ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   ✔ All of the above
   □ None of the above

   (Please define your meaning of "Hybrid".) Vehicle powered by a combination of a heat engine and an electric motor.

7. Please describe your program(s) in terms of:
   The programming language used
   □ FORTRAN IV
   The computer(s) it runs on
   □ CDC 6600
   The approximate number of source code cards
   □ 2 boxes (~2000)
   The approximate number of routines
   □ 53
   Core storage requirements
   □ 124,000 words

8. Your simulation program(s) is:
   ✔ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   ✔ Yes
   □ No
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☐ Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?

☐ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☐ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes Who? ________________ RONALD C. HEFT

☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

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November 23, 1977

JET PROPULSION LABORATORY
California Institute of Technology
4800 Oak Grove Drive
Pasadena, California 91103

Gentlemen:

In response to your November 17, 1977 inquiry regarding automotive performance simulation, we are sorry to state that we do not presently have a computer simulation capability such as your letter inquired about. Our primary field of expertise and competence is in the engineering and design of electrically propelled vehicles.

As a matter of interest and reference, we believe that our credentials and experience are known to Department of Energy staff and industry people and we would welcome the opportunity to be of help to your organization as your interest indicate.

I would appreciate an opportunity to explore this with you further. May we hear from you?

Very truly yours,

BORISOFF ENGINEERING CO.

B. Borisoff, P. E.

BB:kh
Please provide the following information:

Your name ___________ Karl R. Stewart

Your company ___________ Sierra Solar Systems, Inc.

Your company address ___________ P. O. Box 310

________________________________________

Nevada City, California 95959

________________________________________

Your mail stop ____________________________

Your department ____________________________

Your title ___________ Exec. Vice President

Your phone number ___________ 916/272-3444

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes ___________ Name of Program(s) _______________________________________

☐ No

3. Please list program names which are in a usable state.

________________________________________

________________________________________

________________________________________
10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other

12. Can JPL use this data in a survey report for the Department of Energy?
   □ Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   □ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes
   □ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   Aero Power
   2398 4th Street
   Berkeley, CA 94710

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Please provide the following information:

Your name  Roger H. Ducoffre

Your company  Metal Specialists, Inc.

Your company address  16440 Common Road

                            Roseville, MI  48066

Your mail stop

Your department

Your title  Director of Sales

Your phone number  773-0800

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes  Name of Program(s)
   □ No

3. Please list program names which are in a usable state,

    

    

    

    

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10. Is your simulation program(s) designed for:

- Batch mode operation
- Interactive mode
- Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

- EPA urban
- EPA highway
- Some or all SAE J227 schedules
- Other: ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?

- Yes
- No
- Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

- Yes
- No
- Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

- Yes
- No
- Who? ____________________________

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

One of the companies we do work for that has this type of testing equipment is Dana Corp-Parish Division. Our facilities are geared primarily to the metal stamping and assembly area. We are involved in both prototype & production manufacturing of body and chassis components.
Please provide the following information:

Your name: BERT ENSERINK
Your company: Dynamic Science, INC.
Your company address: 1850 W. Pinnacle Peak Rd.

Your mail stop: ____________________________
Your department: ____________________________
Your title: Director, Technical Operations
Your phone number: 602-942-3300

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s) ____________________________
   - [ ] No

3. Please list program names which are in a usable state.
   ____________________________
   ____________________________
   ____________________________
   ____________________________
   ____________________________
   ____________________________
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: LESTER FORREST
Your company: THE AEROSPACE CORPORATION
Your company address: 2350 EAST EL SEGUNDO BLD
EL SEGUNDO, CA 90245
Your mail stop: CONTINENTAL BLD, RM. 602
Your department: MOBILE SISTERS GROUP
Your title: DIRECTOR, VEHICLE PERFORMANCE OFFICE
Your phone number: (213) 648-5752

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes: Name of Program(s) HYBRID VEHICLE TECHNOLOGY
   - No

3. Please list program names which are in a usable state.
   - HYBRID VEHICLE SIMULATION COMPUTER PROGRAM
     1. Power train component sizing program
     2. Energy conservation & emissions program

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4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

(Please define your meaning of "Hybrid".)

7. Please describe your program(s) in terms of:
   - The programming language used: FORTRAN
   - The computer(s) it runs on: COC 7600
   - The approximate number of source code cards: 1: 2000, 2: 3500
   - The approximate number of routines: 20
   - Core storage requirements: 130,000 - 160,000 WORDS

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
10. Is your simulation program(s) designed for:
   - Batch mode operation
   - Interactive mode
   - Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - EPA urban
   - EPA highway
   - Some or all SAE J227 schedules
   - Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - Yes
   - No
   - Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - Yes
   - No
   - Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - Yes Who? Andrew F. Burke
   - No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  

RAYMOND JACOBS, VICE-PRESIDENT

Your company  

MURRILL MOTORS

Your company address  

60143 AUBURN BLVD

CITRUS HEIGHTS, CA. 95610

Your mail stop  

P.O. BOX 41588, SACRAMENTO, CA 95841

Your department  

MANAGEMENT - FINANCE

Your title  

VICE-PRESIDENT

Your phone number  

(916) 723-3377

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes  Name of Program(s)
   - [ ] No

3. Please list program names which are in a usable state,
VEHICLE
SIMULATION
QUESTIONNAIRE

Please provide the following information:

Your name  E.A. Gillis

Your company  Electric Power Research Institute

Your company address  P.O. Box 10412
                        Palo Alto, CA 94303

Your mail stop

Your department  Energy Management & Utilization Technology Dept.

Your title  Project Manager, Fuel Cell Systems

Your phone number  415-493-4800 X 108

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes  Name of Program(s)
   □ No

3. Please list program names which are in a usable state.


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10. Is your simulation program(s) designed for:
- [ ] Batch mode operation
- [ ] Interactive mode
- [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
- [ ] EPA urban
- [ ] EPA highway
- [ ] Some or all SAE J227 schedules
- [ ] Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?
- [ ] Yes
- [ ] No
- [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
- [ ] Yes
- [ ] No
- [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
- [ ] Yes  Who? ____________________________
- [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type:

   HERBICOM, Fort Belvoir, VA 22060  Attn: Dr. J. Huff
   Ford Motor Company
   Las Alamos Scientific Laboratory
   JPL?
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name Steven R. Griffith
Your company Gilbert Associates, Inc.
Your company address Suite 201
1828 L. ST. N.W.
WASHINGTON, D.C. 20036

Your mail stop
Your department Program Development
Your title Planning Engineer
Your phone number 202-331-0852

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s)
   - [ ] No

3. Please list program names which are in a usable state,
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name A.A. Blackerby

Your company Power-Train, Inc.

Your company address 3665 South 300 West

Salt Lake City, Utah 84115

Your mail stop

Your department Corporate

Your title President

Your phone number 801-261-1616

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes Name of Program(s)
   □ No

3. Please list program names which are in a usable state,
10. Is your simulation program(s) designed for:
   - Batch mode operation
   - Interactive mode
   - Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - EPA urban
   - EPA highway
   - Some or all SAE J227 schedules
   - Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - Yes
   - No
   - Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - Yes
   - No
   - Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - Yes
     Who?
   - No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
    International Harvester, Fort Wayne, Indiana
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  W.C. EDWARDS

Your company  EDWARDS ELECTRONIC CORP.

Your company address  44 RAIL ROAD AVE

  GLEN HEAD N.Y. 11545

Your mail stop

Your department

Your title  PRES.

Your phone number  (516) 759-1226

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes  Name of Program(s)
   □ No

3. Please list program names which are in a usable state.


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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ____________ Eugene McManus

Your company __________ Raytheon Company

Your company address __________ Hartwell Road
                                Bedford, MA  01730

Your mail stop __________ M1-46

Your department __________ Marketing and Planning

Your title __________ Marketing Manager, Laboratory Support Technology

Your phone number __________ (617) 274-7100 x4019

If your company does not have an automotive simulation program, go to question 15.
No simulation

1. Indicate the funding source of your simulation program(s).

   ☐ All government funding
   ☐ Some government funding
   ☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

   ☐ Yes   Name of Program(s) ________________________________
   ☐ No

3. Please list program names which are in a usable state,

   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ____________________________

Your company __________________________

Your company address __________________________

__ 30525 AURORA RD__

__ Solon, OH 44139__

Your mail stop __________________________

Your department __________________________

Your title _________________________________

Your phone number __________________________

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [x] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes
   - [ ] Name of Program(s) __________________________
   - [ ] No

3. Please list program names which are in a usable state,

   __________________________
   __________________________
   __________________________
   __________________________
   __________________________

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10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes  Who? ____________________________
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   - INTERNATIONAL HARVESTER IN FT WAYNE IN NO might be able to handle this. They have rather extensive truck testing facilities.
November 21, 1977

Mr. O. Figueroa, Supervisor
Flight Project & Civil Systems Procurements
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91103

Dear Mr. Figueroa:

Enclosed is our response to your questionnaire about our automotive-performance simulation capability.

Our response relates only to the capability of Gould Laboratories-Energy Research. These data are given on the conditions that no specific attribution is made to Gould and that the information is accepted as Commercial Proprietary and protected from release under Exemption 4 of the Freedom of Information Act.

Yours very truly,

S. S. Nielsen
Associate Director-Operations
Gould Laboratories-Energy Research

Will waive above restrictions per conversation with Mr. Nielson on 2/13/78.
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: C. C. Christianson
Your company: Gould Inc.
Your company address: 40 Gould Center
Rolling Meadows, IL 60008
Your mail stop: 
Your department: Gould Laboratories-Energy Research
Your title: Associate Director-Energy Research
Your phone number: 312-640-4410

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes: Name of Program(s): Program's #77010, 77011, 77012, VSIMA1
   - No

3. Please list program names which are in a usable state.
   - #77010 & #77012, EV Acceleration Performance
   - #77011, EV Stead-State Performance
   - VSIMA1, EV Analog Simulation

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4. Is your program(s) available for public use?

☐ Yes
☒ No

5. Is the program(s) described in any publicly available technical publications?

☐ Yes
☒ No

6. Can your simulation program in some manner simulate or predict performance of:

☐ Heat-engine vehicles
☒ Electric vehicles
☐ Hybrid vehicles
☐ All of the above
☐ None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:

   The programming language used Basic, Fortran

   The computer(s) it runs on HP-9830, Honeywell 1648

   The approximate number of source code cards Not applicable

   The approximate number of routines Varies

   Core storage requirements Varies, 15000 words and up

8. Your simulation program(s) is:

☐ Well documented
☒ Partially documented
☐ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?

☐ Yes
☐ No

Not applicable
10. Is your simulation program(s) designed for:
   □ Batch mode operation
   X Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   X Some or all SAE J227 schedules
   X Other USPS Test Cycle

12. Can JPL use this data in a survey report for the Department of Energy? per conversation with Mr. Christianson on 2/7/78.
   X Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   X Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes Who?
   X No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   ____________________________________________
   ____________________________________________
   ____________________________________________
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: Dr. Andrew Wortman
Your company: AWD Inc.
Your company address: 406 Alta Ave.
                      Santa Monica, CA 90402
Your mail stop: 
Your department: 
Your title: Principal Engineer
Your phone number: (213) 394-7332

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   [ ] All government funding
   [ ] Some government funding
   [X] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study? Yes
   [X] Yes Name of Program(s) General Automobile Simulation Program (GASP)
   [ ] No

3. Please list program names which are in a usable state.
   Automobile Performance Study & Evaluation
   Automobile Resistance Using Coasting Timing
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

(Please define your meaning of "Hybrid").

Internal Combustion Engine - Electric Motor-Battery

7. Please describe your program(s) in terms of:
   - The programming language used: FORTRAN
   - The computer(s) it runs on: IBM 360, 370
   - The approximate number of source code cards: 1200
   - The approximate number of routines: 6
   - Core storage requirements: 90K

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
10. Is your simulation program(s) designed for:
   - [x] Batch mode operation
   - [x] Interactive mode
   - [x] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [x] Some or all SAE J227 schedules
   - [ ] Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - [x] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [x] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes  Who? ________________________________________
   - [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

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29 December 1977

T. A. Barber
Manager, Near Term Hybrid Vehicle Program
Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, CA 91103

Dear Mr. Barber:

I attended the pre-solicitation industry briefing on the near-term hybrid vehicle program. It appears that there might be considerable interest in the Hybrid Automobile Simulation Program (HASP) which is described in the enclosed brochure. This computer code was developed by AWD Inc. from an earlier, more general program which was used by AWE in studies of engine-flywheel driven vehicles for the RAM Corp.

It is the intent of AWD Inc. to participate in the hybrid vehicle program in partnership with other concerns. The computer code is ideally suited for parametric studies and concept evaluation and I would like to offer it to JPL as outlined in the enclosed proposal. In view of the urgency of the situation, the proposed contract could be delivered in 45 days with a 25% increase in the labor costs. I shall take the liberty of calling you in a few days to discuss the project further.

Sincerely,

A. Wortman
AWD Inc.
January 13, 1978

Refer to: 624-MPK:mk

Andrew Wortman Developments
Aero-Propulsion Consulting
406 Alta Avenue
Santa Monica, California  90402

Attention: A. Wortman

Gentlemen:

Subject: Unsolicited Proposal to Transfer the Hybrid Automobile Simulation Program from AWD Inc. to the Customer, I.D. 11278

The subject unsolicited proposal has been received in this office. The proposal has been forwarded to the appropriate personnel for technical review and evaluation. Past experience indicates that the review and evaluation takes about thirty working days, depending on the number of personnel interested in the proposed effort.

You will be advised of any interest in the program when the review and evaluation is completed.

Very truly yours,

M. P. Kuhn
Procurement Services
February 1, 1978

Refer to: 624-MPK:mk

Andrew Wortman Developments
Aero-Propulsion Consulting
406 Alta Avenue
Santa Monica, California 90402

Attention: A. Wortman

Gentlemen:

Subject: Unsolicited Proposal to Transfer the Hybrid Automobile Simulation Program from AWD Inc. to the Customer, I.D. 11278

The technical review and evaluation of the subject proposal has been completed. After a thorough review and analysis of the proposal by the appropriate technical and management personnel, we have determined that prior effort has been expended in this area. Therefore, we cannot give any further consideration to funding such a program at this time. One copy of the proposal is being retained for record purposes only.

We appreciate your interest in the activities and programs of the Laboratory.

Very truly yours,

M. P. Kuhn
Procurement Services
DR. ANDREW WORTMAN


Consultant to Northrop Corporation, Science Applications Inc., Spectron Development Labs.

Education

MS in Aerosciences, U.C. Berkeley (1958)
BS in Mechanical Engineering, U.C. Berkeley (1956)

Honors and Appointments

Highest Honors with BS
I. & L. Smith Scholarship (1956-1959) - Highest graduate scholarship, three consecutive years
P. E. F. Scholarship (1956) - Highest undergraduate scholarship
Sigma Xi, Pi Tau Sigma, Tau Beta Pi

Experience

At Northrop Corporation, Ventura Division, engaged primarily in the analysis of complex hydrodynamics and heat transfer problems of advanced underwater vehicles employing laminar flow control concepts. Under a Navy contract developed the first operational computer code using numerical solutions of the governing differential equations for the calculations of flow
around axisymmetric vehicles at angles of attack. Developed a computer code for the complete calculations of inlet duct-jet engine-exhaust duct-nozzle-jet plume systems to provide the basic data for infra-red signal studies.

At Science Applications Inc., manager of the Aerothermodynamics and Energetics Department of the Los Angeles Division. Primarily concerned with the development of a broad analytical capability in heat and mass transfer phenomena encountered in the coal conversion and utilization processes currently under study in the energy research and development program. Contributed the fluidized bed combustion R&D plan which SAI developed under contract to ERDA. Led the engineering effort in a review (under contract to ERDA) of a fluidized bed boiler plant and participated in the LERC Underground Coal Gasification Symposium. Led the studies under an Air Force SAMSO contract, of roughness induced heating augmentation on re-entry vehicles.

At Northrop Corporation, Aircraft Group, directed the development of viscous aerodynamics computation capabilities. Devised techniques for simple, inexpensive, free-flight testing in hypersonic wind tunnels. Among other accomplishments were theoretical and experimental studies of the dynamics of gun blasts and the dynamics of high-speed projectiles in liquid-filled tanks. A Mach 10 wind tunnel test of the effectiveness of foreign gas injection resulted in the development of a patented aerothermodynamic device for measuring altitude, velocity, and attitude of re-entry vehicles. Also engaged in the application of the solution technique developed in his doctoral dissertation to the analysis of three-dimensional aerothermodynamics phenomena in lifting re-entry vehicle flows. As a Postdoctoral Scholar in the UCLA Energy and Kinetics Department, performed fundamental studies in boundary layer heat and mass transfer phenomena.

Before joining Northrop, at STL/TRW (1961-1963), was responsible for the technical direction of the aerothermodynamics of the Tital and Minute Weapon Systems. Main effort was directed at the development of the methods of analysis of complex aerothermodynamics problems of re-entry vehicles and experimental studies of transient heat transfer during silo launches. At UTC/United Aircraft (1960-1961), engaged in research in gas dynamics and heat transfer of liquid and solid propellant rocket motors.
Published numerous company reports and technical notes. List of publications in the open literature indicates the range of capabilities and interests.

PUBLICATIONS


A PROPOSAL TO TRANSFER THE HYBRID AUTOMOBILE SIMULATION PROGRAM FROM AWD-INC TO THE CUSTOMER

AWD Inc proposes to transfer the HASP computer code which is described in the accompanying brochure to the customer. Dr. A. Wortman whose resume is attached will be responsible for making the computer code operational on the customer's computer, preparation of user's manual and the summing of demonstration cases to familiarize the customer's personnel with the functioning of the computational procedure. Assisting Dr. Wortman will be G. Soo Hoo (programming), and G. A. Brinlee (operations and manual preparation). The total time to effect the transfer will be 60 days from the receipt of contract. It is proposed to perform the following tasks:

TASK 1 - Discussions with customer's personnel to determine the exact form of input/output required

TASK 2 - Transfer of source decks to customer's computers, activation and checkout by comparisons with existing calculations

TASK 3 - Arrangement of output data into formats suitable for computer graphics displays which will be developed by the customer's programmers

TASK 4 - Preparation of user's manual in accordance with customer's requirements

TASK 5 - Detailed operational checks on customer's computers and final arrangements of input/output formats

TASK 6 - Instruction of customer's personnel in the operation of the computer codes

TASK 7 - Final demonstration runs, delivery of 20 copies of user's manual and recommendation for future development
COST PROPOSAL

DELIVERABLES

AWD Inc proposes to deliver an operational version of the HASP computer code on the customer's computers, instruction of customer's personnel in the use of the code, 20 copies of user's manual and 3 demonstration cases in 60 days from the receipt of contract. AWD will perform the proposed tasks on the basis of a best effort, cost plus fixed fee contract to be charged as follows

Fee for the transfer of the HASP computer code $10,000

Principal Engineer
Dr. A. Wortman 320 hr @ $25/hr = 8,000

Senior Programmer
G. Soo Hoo 180 hr @ $15/hr = 2,700

Associate Engineer
G. A. Brinlee 160 hr @ $10/hr = 1,600

Overhead @ 27% 3,321
Total $15,621

General and Administrative @ 7% 1,093
Total $16,714 16,714

Fixed fee @ 9% 1,504

Production of user's manual 1,250
Total $29,468
HYBRID AUTOMOBILE SIMULATION PROGRAM
(HASP)

AWD INC
406 ALTA AVENUE
SANTA MONICA CA 90402

PERFORMANCE OF AUTOMOBILES POWERED BY INTERNAL COMBUSTION ENGINES AND ELECTRIC MOTORS SIMULATED ON DIGITAL COMPUTERS

SERVICES OFFERED

• PARAMETERIC STUDIES OF FAMILIES OF CONFIGURATIONS
• STUDIES OF SENSITIVITY TO DESIGN PERTURBATIONS
• EVALUATION OF PROPOSED DESIGNS
• TRANSFER OF COMPUTER CODES TO CUSTOMER

DR. A. WORTMAN
(213) 394-7332
ELEMENTS OF THE HASP COMPUTER CODE

- ELECTRIC MOTOR - INTERNAL COMBUSTION ENGINE COUPLING
- RESISTANCE TO MOTION - INERTIAL, ROLLING, LAMINAR, TURBULENT, VORTEX
- REGENERATION AND CHARGING AT CRUISE CONDITIONS
- VARIABLE RELATION OF THROTTLE TO ENGINE-MOTOR POWER OUTPUT
- MULTIPHASE SCHEDULE OF PERFORMANCE
- AUTOMATIC EVALUATION OF BATTERY REQUIREMENTS
OPERATION OF THE HASP COMPUTER CODE

- STANDARD FORTRAN PROGRAMMING LANGUAGE
- REMOTE TERMINAL OR BATCH INPUT/OUTPUT
- COMPUTER GRAPHICS DISPLAY
- INTERACTIVE SCHEDULING OF PERFORMANCE
- STANDARD OR OPTIONAL DRAG CONTRIBUTIONS
- OPTIONAL REGENERATION
- OPERATION BATTERY CHARGING AT CRUISE CONDITIONS

COMPUTER REQUIREMENTS

- LESS THAN 100K BYTE CORE ON IBM 370/168
- ABOUT 1 SECOND CPU TIME FOR A TYPICAL CASE
FORMULATION OF THE HASP COMPUTER CODE

- Governing differential equations in dimensionless form
- Runge-Kutta Adams-Moulton integration procedure
- Polynomial approximations for - electric motor power
  - engine power
  - fuel consumption
  - drag
- Gear changes at specified engine speeds
- Optional engine-motor coupling
- Power split for recharging at cruise conditions
THROTTLE - POWER SETTING RELATIONS

- THROTTLE - POWER RELATIONS SPECIFIED IN INPUT
- MOTOR BECOMES GENERATOR AT CRUISE CONDITIONS
- OPTIONAL REGENERATIVE BRAKING
ILLUSTRATIVE EXAMPLE

- 3200 LB CAR, 36 HP ICE, 45 HP ELECTRIC MOTOR
- FULL THROTTLE ACCELERATION FROM REST
- CHARACTERISTIC CONSTANTS: $V_0 = 120$ FT/s, $T_0 = 20s$

COMPUTER GRAPHICS OUTPUT

A. ACCELERATION $(T_0/V_0)DV/DT$ VS TIME, T, SECONDS
B. VELOCITY $V$, FT/s, VS TIME, T, SECONDS
C. VELOCITY $V$, FT/s VS DISTANCE, S, FT
D. DISTANCE $S$, FT VS TIME, T, SECONDS
E. FUEL FLOW RATE, FFM, LB/HR, VS TIME, T, SECONDS
F. BATTERY DISCHARGE RATE, $QF$, KW, VS TIME, T, SECONDS
SAMPLE RUN

TIME

0 1 2 3 4 5

U

0 25 50 75 100 125
RELATED EXPERIENCE

• EXTENSIVE COMPUTER SIMULATION OF RAM CORP ENGINE-FLYWHEEL AUTOMOBILES

• TESTING OF VEHICLES USING THE TRAPPED VORTEX CONCEPT

• DEVELOPMENT OF GENERAL AUTOMOBILE SYNTHESIS PROGRAM

• DEVELOPMENT OF AUTOMOBILE DRAG DATA ACQUISITION PROCEDURES AND ANALYSIS

• AUTOMOBILE PERFORMANCE AND DESIGN DATA BANK (25 YEARS)

EXAMPLE

• AUTOMATIC 4-TH ORDER CURVE FIT OF POWER REQUIRED VS SPEED

• COMPUTER PLOT OF ACTUAL AND APPROXIMATE POWER CURVES
Please provide the following information:

Your name ____________________________

Your company ____________________________

Your company address ____________________________

Your mail stop ____________________________

Your department ____________________________

Your title ____________________________

Your phone number ____________________________

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s) ____________________________
   - [ ] No

3. Please list program names which are in a usable state.

   ____________________________
   ____________________________
   ____________________________

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November 19, 1977

Mr. O. Figueroa, Supervisor
Flight Project & Civil Systems Procurements
JPL, California Institute of Technology,
4800 Oak Drive, Pasadena, Ca. 91103

Dear Mr. Figueroa:

Since I do not have an automotive simulation program and was instructed to skip the questions pertaining to it there were a couple that I would like to answer. I will be ready for road testing of the hybrid VW Electric within a month and the Fairlane Ford shortly and I am marking the questions regarding funding in 1 and several of the others which I believe would be pertinent to your program even though I do not have a vehicle simulation program available for computer use.

According to insurance statistics I should be in a box six feet under my gerontologist in New York assures me that I am still good for twenty years or more. I am one of his research subjects and would like to help solve the fuel problem while I am still around. For this reason I will report any progress, good or bad with my work for public dissemination if you so desire, and unless the expenses get out of hand I do not expect any renumeration.

I attended the briefing at Washington and while I was waiting I visited the Space Center exhibit across the street. There I found out that I was ten years old when my mother took me out to camp Meade outside of Washington and I saw one of the Wright brothers and Major Selfridge come up over a hill in one of their acceptance flights for the Army. Before they would let them fly, a handkerchief was dropped to see if the wind was too strong for the flight. Ten years later when I was working for the Bureau of Standards I was at the Smithsonian just around the corner from the space display and I was assured that if the speed of flight went over two hundred miles per hour man would not be able to endure it.

Times have certainly changed in the air since then but technology on the ground as to the electric car has not. Now that JPL has taken it in hand we may see the same transformation as we have seen in air transportation. When I was a young man there were more electrics in the city of Washington than gasoline cars. Perhaps you can bring that about again.

Sincerely,

E.W. Stitt.
Please provide the following information:

Your name Edward W. Stitt.

Your company Stitts Research and Development

Your company address Highway 23, Churchtown, Pa. 17510

Your mail stop Same as above

Your department Research and Development, electric cars with internal engine supplements for hill pulling and braking in the hilly country of this area.

Your title Owner and researcher.

Your phone number (215) 445-6821

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   
   □ Yes Name of Program(s) VW electric to Hybrid
   □ No

3. Please list program names which are in a usable state.

   Volkswagen ready for the road electrically now. Waiting for machine work and parts for hybrid section.
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

(Please define your meaning of "Hybrid"). A basically electric vehicle with a small
gasoline or other fuel such as alcohol engine used to supplement the electric
power on hills which can also be used to charge the batteries down hills and at rest.

7. Please describe your program(s) in terms of:
   - The programming language used. Technical but understandable.
   - The computer(s) it runs on.
   - The approximate number of source code cards.
   - The approximate number of routines.
   - Core storage requirements.

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [X] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [X] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes Who?
   - [X] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   Its been twenty years since I was skipper of U.S. Naval Research Company and do not know what simulation program is. If it consists of research work of an empirical manner with mockups of roadable vehicles, I know what that might be, but where the computers come into the picture is beyond me.
Please provide the following information:

Your name __________________ John A. Bowles

Your company __________________ International Energy Systems Corporation

Your company address _______________ 3000 Sand Hill Road

________________________________________

Menlo Park, California 94025

Your mail stop _________________________

Your department _________________________

Your title _____________________________ Director

Your phone number _____________________ (415) 854-1124

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

□ All government funding

□ Some government funding

□ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

□ Yes Name of Program(s)______________________________

□ No

3. Please list program names which are in a usable state.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

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10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other

12. Can JPL use this data in a survey report for the Department of Energy?
   □ Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   □ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes Who? __________________________
   □ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   ______________________________________________________
   ______________________________________________________
   None in the U.S. - but both of the companies we are working with overseas have their own extensive simulation programs.
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name — J. Muir

Your company — Dimension IV Inc.

Your company address — 595 Seabreeze Dr.

Indianapolis, FLA 32903

Your mail stop

Your department

Your title — Pres.

Your phone number — 305-724-1414

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes Name of Program(s)
   □ No

3. Please list program names which are in a usable state.

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: Bob Evans
Your company: Titan, Inc.
Your company address: P.O. Box 912 Temple City, CA 91780
7915 Spohn Ave. Fontana, CA 92335

Your mail stop
Your department
Your title: President
Your phone number: 213-286-1739 714-823-2114

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s)
   - [ ] No

3. Please list program names which are in a usable state,
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name       Edward N. Mrotek
Your company    Globe Union, Inc.
Your company address  5757 N. Green Bay Ave
                      Milwaukee, Wis. 53201
Your mail stop   3X6
Your department  Battery Engineering
Your title       Product Development Engineer
Your phone number  414-228-2424

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes	Name of Program(s)________________________
   □ No

3. Please list program names which are in a usable state,


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10. Is your simulation program(s) designed for:
   [ ] Batch mode operation
   [ ] Interactive mode
   [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   [ ] EPA urban
   [ ] EPA highway
   [ ] Some or all SAE J227 schedules
   [ ] Other ________________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   [ ] Yes
   [ ] No
   [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   [ ] Yes
   [ ] No
   [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [ ] Yes Who? ________________________________
   [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   General Electric Company
   Corporate Research & Development
   P.O. Box 43 (Bldg 37) Room 20838
   Schenectady, New York
   12301
   Attn: Mr. E.A. Rowland
   133
Please provide the following information:

Your name ____________________________ Edmond X. Ramirez, Sr. ____________________________

Your company ____________________________ AMECTRAN, INC. ____________________________

Your company address ____________________________ 8585 N. Stemmons Fwy. Suite 900 Twin Towers South ____________________________

Dallas, Texas 75247 (214) 638-8631 ____________________________

Your mail stop ____________________________ N/A ____________________________

Your department ____________________________ N/A ____________________________

Your title ____________________________ President ____________________________

Your phone number ____________________________ (214) 638-8631 ____________________________

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☒ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☒ Yes Name of Program(s) Amectran's criteria for practical use of electric automobiles

☐ No

3. Please list program names which are in a usable state.

Amectran's criteria for practical use of electric automobiles


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4. Is your program(s) available for public use?

☐ Yes
☒ No

5. Is the program(s) described in any publicly available technical publications?

☐ Yes
☒ No

6. Can your simulation program in some manner simulate or predict performance of:

☐ Heat-engine vehicles
☒ Electric vehicles
☐ Hybrid vehicles
☐ All of the above
☐ None of the above

(Please define your meaning of "Hybrid").

__________________________________________________________________________

7. Please describe your program(s) in terms of:

The programming language used  Assembly & Basic

The computer(s) it runs on  Quantell

The approximate number of source code cards  1800

The approximate number of routines  24

Core storage requirements

__________________________________________________________________________

8. Your simulation program(s) is:

☐ Well documented
☐ Partially documented
☒ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?

☐ Yes
☒ No
10. Is your simulation program(s) designed for:
   [ ] Batch mode operation
   [x] Interactive mode
   [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   [ ] EPA urban
   [ ] EPA highway
   [ ] Some or all SAE J227 schedules
   [x] Other: 'Ametran's criteria for practical use of electric automobiles

12. Can JPL use this data in a survey report for the Department of Energy?
   [ ] Yes
   [x] No
   [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   [x] Yes
   [ ] No
   [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [ ] Yes  Who? ____________________________________________
   [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
    None
Please provide the following information:

Your name: **Fred A. Cohan**
Your company: **System Development Corp.**
Your company address: **2500 Colorado St.**
**Santa Monica, CA 90406**
Your mail stop: **52-19**
Your department: **System Engineering**
Your title: **Vice President**
Your phone number: **(213) 829-9562**

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s):________________________
   - [ ] No

3. Please list program names which are in a usable state,

   ____________________________
   ____________________________
   ____________________________

   137
10. Is your simulation program(s) designed for:
   [ ] Batch mode operation
   [ ] Interactive mode
   [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   [ ] EPA urban
   [ ] EPA highway
   [ ] Some or all SAE J227 schedules
   [ ] Other ________________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   [ ] Yes
   [ ] No
   [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   [ ] Yes
   [ ] No
   [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [ ] Yes  Who? ________________________________
   [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   SYSTEM CONTROL, INC.; 1801 PAGE MILL RD; PALO ALTO, CA 94304

   138
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  Laura L. Omohundro, Executive Assistant

Your company  KINERGY RESEARCH & DEVELOPMENT (A Division of MARSHALL OIL CO., INC.)

Your company address  P.O. Box 1128 (Corporate Mailing Address)
                      820 South Main Street (Corporate Physical Address)
                      Wake Forest, NC 27587

Your mail stop  Same as Corporate Address

Your department  KINERGY RESEARCH & DEVELOPMENT

Your title  Executive Assistant

Your phone number  (919)876-4963 (Research) or (919)556-2141

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes  Name of Program(s)
   □ No

3. Please list program names which are in a usable state.
   
   
   
   
   139
10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other__________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   □ Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   □ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes   Who? ________________________________
   □ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   University of Wisconsin, Professor Andrew A. Frank, School of Engineering
   Note: We are privately funded and have not installed a simulator. We have a chassis dynamometer and do actual driving tests on urban and highway cycles we designed.

   140
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ___________________________ Raymond J. Twardzik

Your company ___________________________ General Electric Co.

Your company address ___________________________ Corporate Res. & Dev.

Corporate Res. & Dev.

Bldg 37-2083

Schenectady, N.Y. 12345

Your mail stop ___________________________

Your department ___________________________ Corporate Research & Development

Your title ___________________________ System Engineer

Your phone number ___________________________ 518-385-0091

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

X No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes Name of Program(s) NAR-TERM ELECTRIC VEHICLE PROGRAM - PHASE II

☐ No

3. Please list program names which are in a usable state.

ELCARIO

141
4. Is your program(s) available for public use?
   - [ ] Yes
   - [x] No

5. Is the program(s) described in any publicly available technical publications?
   - [ ] Yes
   - [x] No

6. Can your simulation program in some manner simulate or predict performance of:
   - [ ] Heat-engine vehicles
   - [x] Electric vehicles
   - [ ] Hybrid vehicles
   - [ ] All of the above
   - [ ] None of the above

   (Please define your meaning of "Hybrid".)

7. Please describe your program(s) in terms of:

   The programming language used: **FORTRAN IV**
   The computer(s) it runs on: **H-605**
   The approximate number of source code cards: **700**
   The approximate number of routines: **5**
   Core storage requirements: **10K WORDS**

8. Your simulation program(s) is:
   - [x] Well documented
   - [ ] Partially documented
   - [ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - [ ] Yes
   - [ ] No

   142
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [x] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [x] Some or all SAE J227 schedules
   - [ ] Other_____________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - [x] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [x] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [x] Yes  Who?  T. A. ALFA GVER  BLDG 198-112
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   __________________________________________
   __________________________________________
   __________________________________________

143
Please provide the following information:

Your name  **Theodore W. Blickwedel**  
Your company  **ESB Technology Center (ESB Inc.)**  
Your company address  **19 West College Ave.  
Yardley, Pa. 19067**  

Your mail stop  
Your department  
Your title  **Senior Scientist**  
Your phone number  **(215) 493-3601 ext 305**  

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [X] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s)  
   - [X] No

3. Please list program names which are in a usable state,  
   **HYBRID**  

144
4. Is your program(s) available for public use?
   □ Yes
   □ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   □ All of the above
   □ None of the above

   (Please define your meaning of "Hybrid".) Low Power Heat Engine plus Battery Powered Electric Engine for fast acceleration and high speeds.

7. Please describe your program(s) in terms of:
   The programming language used ____________ Fortran IV
   The computer(s) it runs on ____________ EAI 640
   The approximate number of source code cards ____________ 435
   The approximate number of routines ____________ 55
   Core storage requirements ____________ 15232 16-bit words

8. Your simulation program(s) is:
   □ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   □ Yes
   □ No
10. Is your simulation program(s) designed for:
   ☑ Batch mode operation
   ☐ Interactive mode
   ☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   ☑ EPA urban
   ☑ EPA highway
   ☑ Some or all SAE J227 schedules
   ☑ Other [Any schedule where vehicle speed is specified in one-second intervals. Maximum 1099 velocities to be specified]

12. Can JPL use this data in a survey report for the Department of Energy?
   ☑ Yes
   ☐ No
   ☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   ☑ Yes
   ☐ No
   ☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   ☑ Yes
   ☐ No
   ☐ Who? ____________________________

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

__________________________________________
__________________________________________
__________________________________________
Please provide the following information:

Your name: DAVID L. HARBAUGH, P.E.

Your company: SOUTHERN CALIF EDISON CO

Your company address: 7830 OTIS AVE
                     HUNTINGTON PARK, CALIF 90255

Your mail stop: ____________________________

Your department: AUTOMOTIVE SERVICES

Your title: AUTOMOTIVE ENGINEER

Your phone number: (213) 510-1822

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s) ____________________________
   - [ ] No

3. Please list program names which are in a usable state.
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________

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10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☐ Other__________________________

12. Can JPL use this data in a survey report for the Department of Energy?

☐ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☐ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes Who?__________________________
☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

______________________________

ORSHANSKY TRANSMISSION CORP
SAN DIEGO, CALIF.

148
Please provide the following information:

Your name: Norman H. Beachley
Your company: U. of Wisconsin - Madison
Your company address: M.E. Dept., U. of Wisconsin
1513 University Ave.
Madison, WI 53706

Your mail stop
Your department: Mech. Engineering
Your title: Assoc. Professor
Your phone number: (608) 262-3594

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - ☑ All government funding
   - ☐ Some government funding
   - ☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - ☑ Yes
     Name of Program(s): (Flywheel Automotive Propulsion Simulator)
     CARS/M
     Hybrid Car Simulator
   - ☐ No

3. Please list program names which are in a usable state,
   a) Automotive Propulsion Simulator (APS)
   b) CARS/M
   c) Flywheel Automotive Propulsion Simulator
   d) Hybrid Car Simulator
4. Is your program(s) available for public use?
   □ Yes
   □ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes (Programs A and C)
   □ No (Programs B and D)

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   □ All of the above
   □ None of the above

   (Please define your meaning of "Hybrid".) A vehicle having two or more sources of power, one of which may be a reversible energy storage system.

7. Please describe your program(s) in terms of:
   The programming language used: FORTRAN
   The computer(s) it runs on: UNIVAC 1100
   The approximate number of source code cards: ~100 to ~4000
   The approximate number of routines: 5 to 50
   Core storage requirements

8. Your simulation program(s) is:
   □ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   □ Yes
   □ No
10. Is your simulation program(s) designed for:
   - [x] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [x] EPA urban
   - [x] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [x] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [x] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [x] Yes Who? Andrew Burke
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   GM Ford
VEHICLE
SIMULATION
QUESTIONNAIRE

Please provide the following information:

Your name ____________________________
John C. H. Woo

Your company __________________________
Trans Systems Corporation

Your company address ____________________
118 Park St., S. E., Madison Bldg.; Vienna, Va. 22180

Your mail stop __________________________
N. A.

Your department _________________________

Your title ______________________________
President

Your phone number ______________________
281-4498; 281-1500

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding
☐ Some government funding
☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes Name of Program(s) ____________________________

☐ No

3. Please list program names which are in a usable state.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: J. Arias

Your company: Jeffrey L Arias Engineering Services

Your company address: 9241 Cord Ave
Downey, CA 90240

Your mail stop

Your department

Your title

Your phone number: (213) 861 4086

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - □ All government funding
   - □ Some government funding
   - □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - □ Yes Name of Program(s)
   - □ No

3. Please list program names which are in a usable state,

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10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   □ Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   □ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes Who? ____________________________
   □ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   Orshansky Transmission Corp
   6111 Santa Fe St
   San Diego, CA 92109
   atten: Peter Houtley
Please provide the following information:

Your name ________________________________

Your company ________________________________

Your company address ________________________________

Your mail stop ________________________________

Your department ________________________________

Your title ________________________________

Your phone number ________________________________

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes Name of Program(s) ________________________________

☐ No

3. Please list program names which are in a usable state,

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

155
The CHW four passenger electric sedans are engineered for practical, low cost urban and short run driving. Operating solely on battery power they produce no air pollution and require only a fraction of the maintenance of conventional autos. All models have independent front suspension systems with drum brakes, automatic vari-speed transmission, bucket seats, fully instrumented dash, four way safety warning flashers, safety lights, windshield washers, vinyl upholstery, lap and shoulder harnesses and innumerable other creature-comforts.

Electric power eliminates two prime sources of pollution on the highway: engine noise and exhaust emission. Electric automobiles are the only practical answer to this threat to our ecology.

Why not drive a CHW today and be one of the first to experience what is surely in everyone’s future — pollution-free electric transportation?

Nothing beats electric vehicles for economy of transportation. The slightly higher cost is quickly offset by the fractional cost of operation both in fuel savings and much reduced maintenance charges. Imagine an automobile without mufflers and exhaust system, radiator and cooling system, spark plugs, carburetor and fuel tank and you quickly get the picture of a simple, easy-to-maintain vehicle. That’s what the CHW Electric is all about; with only one moving part in the power plant and a once-a-year check of the the motor brushes the only important electrical concern you have the essence of carefree economical driving.

Instant Starts As Only Electric Power Can Provide!

Just turn the key and touch the accelerator and your CHW goes in any weather — unaffected by cold, dampness, fuel system condensation or the multitude of other ills that can disable gasoline engines. Truly dependable performance.
SPECIFICATIONS

DIMENSIONS

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BRAKES

Tandem type hydraulic, drum.

LIGHTING

Parking and turn signals, brake fluid warning light, stop lights, interior light, safety side marker lights, four way safety flasher, sealed beam headlites, instrument lights.

POWER SPECIFICATIONS

Motor—48 Volt DC, traction.
Power Source—Sixteen 6 volt electric vehicle batteries.
Speed Control—Three step, foot operated.
Speed—Maximum 45 MPH.
Acceleration—0-25 MPH/15 seconds.
Range—To 50 miles standard. 80 miles with additional battery pack.

INSTRUMENTS

Speedometer, two speed windshield wipers, windshield washers, electric heater/defroster, glove compartment, sensitive battery-state meters, key with steering lock.

RECHARGING

Overnight from standard 115 volt, 20 amp circuit. Rapid charging available with special wiring.

C. H. WATERMAN INDUSTRIES

White Pond Road    ATHOL, MASS. 01331    Telephone 617 — 249-6801

OR SEE YOUR LOCAL DISTRIBUTOR

157
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  **Paul F. Bohn**

Your company  **Applied Physics Laboratory**

Your company address  **Johns Hopkins Road Laurel, Maryland 20810**

Your mail stc.  **1E-156**

Your department  

Your title  **Section Supervisor**

Your phone number  **301-953-7100 X2193**

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes  Name of Program(s)  **FHWA**
   - [ ] No

3. Please list program names which are in a usable state,
   - **HVHP (HYBRID VEHICLE HANDLING PROGRAM), 17 DOF VEHICLE MODEL SOLUTION**
   - **TVDS3 (THREE DIMENSIONAL VEHICLE SIMULATION), ALL DIGITAL, ARTICULATED**
   - **HSRE ARTICULATED VEHICLE SIMULATION**
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above
   (Please define your meaning of "Hybrid"): Combination of Energy Sources: i.e., Gasoline/Electric, Flywheel/Electric, etc.

7. Please describe your program(s) in terms of:
   - The programming language used: FORTRAN
   - The computer(s) it runs on: IBM 360/91, EAI 680
   - The approximate number of source code cards: Two Boxes
   - The approximate number of routines: 20
   - Core storage requirements: 175 K BYTES

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
10. Is your simulation program(s) designed for:
   [ ] Batch mode operation
   [x] Interactive mode
   [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   [ ] EPA urban
   [ ] EPA highway
   [ ] Some or all SAE J227 schedules
   [ ] Other (any can be added currently have NHSTA VEHICLE HANDLING TEST PROCEDURES)

12. Can JPL use this data in a survey report for the Department of Energy?
   [x] Yes
   [ ] No
   [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   [x] Yes
   [ ] No
   [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [ ] Yes  Who? 
   [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   [ ] CALSPAN CORP
   [ ] HIGHWAY SAFETY RESEARCH INST., U. OF MICHIGAN
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  Paul J. Dick

Your company  Teledyne Energy Systems

Your company address  110 W. Timonium Road

Timonium, Maryland 21093

Your mail stop

Your department  Advanced Programs

Your title  Manager

Your phone number  252-8220, (301) Ext. 211, 212

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes Name of Program(s)

☐ No

3. Please list program names which are in a usable state,

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  

HANIFY, DENNIS W.  

Your company  

IIT RESEARCH INSTITUTE  

Your company address  

10 W. 35 ST.  

CHICAGO, ILL.  

60616  

Your mail stop  

Your department  

MECHANICAL & SYSTEMS RESEARCH  

Your title  

MANAGER  

Your phone number  

312/567-4751  

If your company does not have an automotive simulation program, go to question 15.

ANSWERS TO QUESTIONS REFER TO HV/SIM MODEL ONLY

1. Indicate the funding source of your simulation program(s).

☐ All government funding  

☐ Some government funding  

☒ No government funding  

2. Are you currently using any of your simulation programs for some type of vehicle study?

☒ Yes  Name of Program(s)  

HV/SIM  

☐ No  

3. Please list program names which are in a usable state.

(HV/SIM) HYBRID VEHICLE SIMULATOR  

(AVDS) ARTICULATED VEHICLE DYNAMIC SIMULATION  

(3DVS) 3-DIMENSIONAL VEHICLE SIMULATION  

(TRANSIM) TRANSPORTATION SIMULATOR  

(WRECKER) FINITE ELEMENT ANALYSIS MODEL FOR VEHICLE CRASH WORTHINESS
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid".) ICE/ELECTRIC

   BOTH SERIES AND PARALLEL

7. Please describe your program(s) in terms of:
   - The programming language used: **FORTRAN II**
   - The computer(s) it runs on: **1108**
   - The approximate number of source code cards
   - The approximate number of routines
   - Core storage requirements

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes per conversation with D. Hanify on 2/7/78.
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
    - [ ] Yes Who?
    - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
    - WE CAN ALSO ACCESS FLAT MODELS FOR ICE, ELECTRIC AND H.V. SIMULATION.
    - ICE & H.V. MODELS CAN DO EMISSIONS.
Brian Christensen, now at Battelle (Columbus, Ohio), was sent a questionnaire. He called to state that he was probably not at the questionnaire because of work he did while at the Univ. of Wisconsin - he co-authored a paper while at U of N. He wanted to know if he should fill out the questionnaire on behalf of Battelle. I told him yes if Battelle would provide the information that it would be OK.

Decision
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  DR. WALTER W. WERWILE
Your company  VIRGINIA Polytechnic Inst. & State Univ.
Your company address  142 Whittemore Hall
                     IEOR DEPT.
                     BLACKSBURG, VA. 24061

Your mail stop
Your department  IEOR
Your title  PROFESSOR
Your phone number  951-5358

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding  [GM funding]
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes  Name of Program(s)  HUMAN PERFORMANCE IN SIMULATED DRIVING
   - No

3. Please list program names which are in a usable state.
   WE HAVE A DRIVING SIMULATOR. IT HAS
   6° OF DISPLAY MOTION, 4° OF PHYSICAL MOTION,
   4 channels of sound vibration. It can be
   programmed to study effect of driver action
   on fuel economy. It can also be used for
   training re: fuel economy. Simulator has accurate handling.
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   - The programming language used
   - The computer(s) it runs on
   - The approximate number of source code cards
   - The approximate number of routines
   - Core storage requirements

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No

   (Please provide equations or a full explanation.)
10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other __________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   [X] Yes  per conversation with Dr. Wierwille on 2/14/78.
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   □ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [X] Yes  Who? __________________________
   □ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

__________________________________________
__________________________________________
__________________________________________

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VEHICLE
SIMULATION
QUESTIONNAIRE

Please provide the following information:

Your name  DAVID C. CURPHEY
Your company  ENGINEERED SYSTEMS DIV. FMC CORPORATION
Your company address  328 BROKAW ROAD
                                      SANTA CLARA, CA 95050

Your mail stop
Your department  Government Operations
Your title  MANAGER, CIVIL AGENCY'S SECTOR
Your phone number  408-287-2378

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   [ ] All government funding
   [ ] Some government funding
   [x] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   [ ] Yes  Name of Program(s)
   [x] No

3. Please list program names which are in a usable state.
   MISSION ANALYSIS (4 MAJOR SUBROUTINES - NAMES PROPRIETARY)

4. 169
4. Is your program(s) available for public use?
   □ Yes
   ☑ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   ☑ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   ☑ Electric vehicles
   □ Hybrid vehicles  See below.
   □ All of the above
   □ None of the above

(Please define your meaning of "Hybrid".) Also Mission Analysis Capability/ For Flywheel Powered Vehicle.

7. Please describe your program(s) in terms of:
   The programming language used  Mostly FORTRAN IV
   The computer(s) it runs on  HP TerminaL to IBM 370
   The approximate number of source code cards  Proprietary Info.
   The approximate number of routines  5
   Core storage requirements  8K (MIN) (Local)

8. Your simulation program(s) is:
   □ Well documented
   ☑ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   □ Yes
   ☑ No
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [X] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [X] Some or all SAE J227 schedules (NOT DIRECTLY, but close).
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [X] Yes per conversation with Mr. Curphey on 2/7/78.
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [X] Yes
   - [ ] No
   - [ ] Maybe
      
      As this program is presently configured, it is quite crude and would be of no use to anyone other than FMC engineering personnel.

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [X] Yes
   - [ ] No
   - [ ] Who?

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   
   ordinance engineering division of FMC has a substantial library of vehicle simulation programs.
   
   ___________________________________________________________________________________

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Please provide the following information:

Your name: PROF. ANDREW FRANK
DEPT. OF ELECT. & COMP. ENG.

Your company: UNIV. OF WISCONSIN - MADISON

Your company address:
900 ERB
1500 JOHNSON DRIVE
MADISON, WI 53706

Your mail stop __________________________

Your department __________________________

Your title __________________________

Your phone number: (608) 262-1577

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding
☐ Some government funding
☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes  Name of Program(s): 1. Automotive Propulsion Simulation
☐ No

2. Flywheel Propulsion Simulation

3. Please list program names which are in a usable state,

1. APS
2. FEMP  Flywheel Energy Management Propulsion
3. RUN MODULE
4. CAR SIMULATION

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4. Is your program(s) available for public use?
   - [X] Yes
   - [ ] No

5. Is the program(s) described in any publicly available technical publications?
   - [X] Yes
   - [ ] No

6. Can your simulation program in some manner simulate or predict performance of:
   - [ ] Heat-engine vehicles
   - [X] Electric vehicles
   - [ ] Hybrid vehicles
   - [ ] All of the above
   - [ ] None of the above

(Please define your meaning of "Hybrid"). __Vehicles with primary and secondary energy available for drive__.

7. Please describe your program(s) in terms of:
   - The programming language used: **FORT Ran IV**
   - The computer(s) it runs on: **UNIVAC 1110, Harris 16**
   - The approximate number of source code cards: 1000
   - The approximate number of routines: 40
   - Core storage requirements:

8. Your simulation program(s) is:
   - [X] Well documented
   - [X] Partially documented
   - [ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - [X] Yes
   - [ ] No

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10. Is your simulation program(s) designed for:
   - Batch mode operation [X]
   - Interactive mode [ ]
   - Both of the above [ ]

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - EPA urban [ ]
   - EPA highway [ ]
   - Some or all SAE J227 schedules [ ]
   - Other: [Other] 

12. Can JPL use this data in a survey report for the Department of Energy?
   - Yes [ ]
   - No [ ]
   - Maybe (A "maybe" will be considered a "no" until resolved) [ ]

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - Yes [X]
   - No [ ]
   - Maybe [ ]

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - Yes [ ]
   - No [X]
   - Who? [Gerhard Klose, Mack Dowdy, Andrew Burke]

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   - [Ford]
   - [GM]

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November 11, 1977

Dr. Gelb will respond for TRW. Thank you for your inquiry.

R. H. Sparks
MS M1/1208
TRW Systems Incorporated
One Space Park
Redondo Beach, California 90278

Dear Sir:

The Jet Propulsion Laboratory (JPL) has been requested by the Department of Energy to conduct a survey of automotive-performance simulation capability within the United States and, in particular, electric and hybrid vehicle performance simulation capability within the industry and government sectors. The results will be published and made available to the public.

Attached is a questionnaire designed to give JPL a brief indication of your automotive performance simulation capability. The questions are yes/no or multiple-choice types which will convey information to JPL with a minimum expenditure of your time. The questionnaire should require approximately 10 minutes to complete.

Please help us by indicating your answers to the questions and returning the questionnaire in the self-addressed, stamped envelope provided. Your prompt response will be greatly appreciated.

It is emphasized that this is a request for information only and does not constitute a commitment, implied or otherwise, that JPL will take any procurement action. JPL or the Government cannot be responsible for any cost incurred in furnishing this information.

Very truly yours,

O. Figueroa, Supervisor
Flight Project & Civil Systems
Procurements

PD:cm

enclosure

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Please provide the following information:

Your name

Your company

Your company address

Your mail stop

Your department

Your title

Your phone number

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes Name of Program(s)
   □ No

3. Please list program names which are in a usable state.
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☐ Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?

☐ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☐ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes  Who? ____________________________

☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

See attached list ____________________________
The following have some automotive performance simulation capabilities and should probably receive your questionnaire:

1. The University of Michigan
   College of Engineering
   Attn: David V. Ragone, Dean
   Ann Arbor, Michigan 48104
   Phone: 313/764-8470

2. Wayne State University
   College of Engineering
   Attn: Dean Stynes
   Room 141 - 5050 Anthony Wayne Drive
   Detroit, Michigan 48202
   Phone: 313/577-3775
   (Note: Extensive experience in crash studies.)

3. University of Detroit
   Attn: Dr. Thomas Manos
   College of Engineering & Science
   4001 West McNichols
   Detroit, Michigan 48221
   Phone: 313/927-1216

4. Lawrence Institute of Technology
   Attn: Dr. Stephen R. Davis
   Dean, School of Engineering
   2100 West 10 Mile Road
   Southfield, Michigan 48075
   Phone: 313/356-0200

5. Creative Industries of Detroit
   Attn: Richard S. Leasia
   3080 East Outer Drive
   Detroit, Michigan 48234
   Phone: 313-366-3020
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: GORDON F. HAYHCE

Your company: THE PENNSYLVANIA TRANSPORTATION INSTITUTE

Your company address: RESEARCH BUILDING B

THE PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY PARK, PA 16802

Your mail stop: _____________________________

Your department: _____________________________

Your title: ASSISTANT PROFESSOR

Your phone number: (814) 865-1891

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes Name of Program(s) PEUCon ELECTRIC VEHICLE,
   NCHRP PROJECT 20-7, TASK 10 "REVIEW OF TRUCK/WEIGHT/HORSEPOWER RATIO"
   □ No

3. Please list program names which are in a usable state.
   "TRCLMB"
   "EVACCE"
   "EVSASAE"
4. Is your program(s) available for public use?
   □ Yes
   ☑ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   ☑ No

6. Can your simulation program in some manner simulate or predict performance of:
   ☑ Heat-engine vehicles
   ☑ Electric vehicles
   □ Hybrid vehicles
   □ All of the above
   □ None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   The programming language used __FORTRAN__
   The computer(s) it runs on __IBM 370/168__
   The approximate number of source code cards __400__
   The approximate number of routines __6__
   Core storage requirements __40 K__

8. Your simulation program(s) is:
   □ Well documented
   ☑ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   □ Yes
   ☑ No
10. Is your simulation program(s) designed for:
   - [x] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [x] Some or all SAE J227 schedules
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   - [x] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [x] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [x] No
   - [ ] Yes Who? ____________________________

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   ____________________________
   ____________________________

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Please provide the following information:

Your name  Gene W. Brown
Your company  International Harvester
Your company address  3301 Wayne Trace
                     Ft. Wayne IN 46803
Your mail stop
Your department  Sales Engineering
Your title  Sales Engineer
Your phone number  219/461-6160

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   X No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   X Yes  Name of Program(s)  TCAPE
   □ No

3. Please list program names which are in a usable state.
   TCAPE
   PERFOR
4. Is your program(s) available for public use?

[ ] Yes
[ ] No

5. Is the program(s) described in any publicly available technical publications?

[ ] Yes
[ ] No

6. Can your simulation program in some manner simulate or predict performance of:

[ ] Heat-engine vehicles
[ ] Electric vehicles
[ ] Hybrid vehicles
[ ] All of the above
[ ] None of the above

(Please define your meaning of "Hybrid".)

7. Please describe your program(s) in terms of:

   The programming language used __**Fortran**__
   The computer(s) it runs on __**Digital Equipment**__
   The approximate number of source code cards __**Not Known**__
   The approximate number of routines __**10**__
   Core storage requirements __**?**__

8. Your simulation program(s) is:

[ ] Well documented
[ ] Partially documented
[ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?

[ ] Yes
[ ] No

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10. Is your simulation program(s) designed for:

☐ Batch mode operation
☒ Interactive mode
☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☒ Other We originated City, Suburban, & Highway cycles for a Truck.

12. Can JPL use this data in a survey report for the Department of Energy?

☒ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☒ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes Who? ____________________________
☒ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

Cummins VMS
Detroit Diesel PREPP
Caterpillar
International Harvester Engineering Research

Have Electric Vehicle Program

7 South 600 County Line Rd.
Hinsdale, IL 60521
Att: Gene Wallace
Please provide the following information:

Your name: Fritz G. Will
Your company: General Electric Co., RD&D Labs
Your company address: Schenectady, NY 12301

Your mail stop
Your department
Your title
Your phone number

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes  Name of Program(s)
   - [ ] No

3. Please list program names which are in a usable state.


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November 29, 1977

Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, California 91103

Attn: Mr. O. Figueroa, Supervisor
Flight Project & Civil Systems Procurements

Gentlemen:

I am responding to your letter to Mr. Steve Schiffer received on November 18, 1977. I have completed the Vehicle Simulation Questionnaire as requested, describing our program for battery electric vehicle performance prediction. The enclosed paper, presented at EVS 4, shows how this program is typically used. Output is in the form of vehicle range vs. speed for a given set of inputs as noted in the program equations.

The program is available for use on a funded basis and we would be pleased to discuss this aspect further with JPL or DOE representatives.

Please let me know if we can be of further service.

Very truly yours,

YARDNEY ELECTRIC DIVISION

John H. Kennedy
Staff Director
Nickel Battery Development Center

JHK/dlj

A SUBSIDIARY OF THE WHITTAKER CORPORATION
Please provide the following information:

Your name: John H. Kennedy
Your company: Yardney Electric Corp.
Your company address: 82 Mechanic Street
Pawcatuck, Connecticut 06379
Your mail stop: 
Your department: Nickel Battery Development Center
Your title: Staff Director, NBDC
Your phone number: 203-599-1100 Ext. 368

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [X] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes
   - [X] No

3. Please list program names which are in a usable state.
   - Vehicle Energy Consumption Program
   - Battery Energy Available Program
4. Is your program(s) available for public use?
   - Yes [X]
   - No [ ]

5. Is the program(s) described in any publicly available technical publications?
   - Yes - brief description in enclosed paper [X]
   - No [ ]

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles [ ]
   - Electric vehicles [X]
   - Hybrid vehicles [ ]
   - All of the above [X]
   - None of the above [ ]

   (Please define your meaning of "Hybrid".)

7. Please describe your program(s) in terms of:
   - The programming language used: Coded sequence of arithmetic operations
   - The computer(s) it runs on: Monroe Model 1655 Desktop
   - The approximate number of source code cards: 4
   - The approximate number of routines: 2
   - Core storage requirements: NA

8. Your simulation program(s) is:
   - Well documented [ ]
   - Partially documented [X]
   - Not too well documented [ ]

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes [ ]
   - No [X]
10. Is your simulation program(s) designed for:
   □ Batch mode operation
   X Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   X Some or all SAE J227 schedules
   X Other __________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   X Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   X Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes  Who? __________________________
   X No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   Ford
   A. D. Little
   General Motors
Please provide the following information:

Your name _______________________________ Richard A. Evans

Your company ____________________________ Honeywell Inc.

Your company address ______________________

Energy Resources Center

2000 Ridgway Parkway

MPLS, MINN. 55413

Your mail stop ____________________________ MN 17 T123

Your department __________________________ Energy Resources Center

Your title _________________________________ Section Chief

Your phone number _________________________ 612 378 4232

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [x] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s) ____________ Hydrocar
   - [x] No

3. Please list program names which are in a usable state,

   _______________________________________
   _______________________________________
   _______________________________________
4. Is your program(s) available for public use?
   □ Yes
   X No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   X No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   X Hybrid vehicles
   □ All of the above
   □ None of the above

   (Please define your meaning of "Hybrid".)

7. Please describe your program(s) in terms of:
   The programming language used _______ Fortran
   The computer(s) it runs on _______ Honeywell 610, IBM 7094
   The approximate number of source code cards _______ 200
   The approximate number of routines _______ N. A.
   Core storage requirements _______ 2K - 3K

8. Your simulation program(s) is:
   □ Well documented
   □ Partially documented
   X Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   X Yes
   □ No

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10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other_ Minnesota's Driving cycle - Self Defined

12. Can JPL use this data in a survey report for the Department of Energy?
   □ Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   □ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes Who?________________________
   □ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  J.D. Musik
Your company  Iowa St. Univ.
Your company address  107 Coover Hall

Your mail stop
Your department  EE
Your title  Assoc Prof
Your phone number  515-294-4072

If your company does not have an automotive simulation program, go to question 15.

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, CA 91103

Gentlemen:

Thank you for your interest and consideration in including MBAssociates in your automotive-performance simulation capability survey.

We have reviewed your letter and attached questionnaire, and determined that we do not possess the required technology.

Again, thank you for your consideration.

Very truly yours,

JAMES L. ROYLAND
Vice-President

JLB:eg
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ____________________________ Michael Orchowski
Your company __________________________ Minicars, Inc.
Your company address ____________________ 35 La Patera Lane
______________________________________ Goleta, CA 93017

Your mail stop __________________________
Your department _________________________
Your title ______________________________ Senior Staff Analyst
Your phone number ______________________ (805) 964-6271 x45

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   [ ] All government funding
   [ ] Some government funding
   [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   [ ] Yes Name of Program(s) 1, CARSIM; 2, Automotive Propulsion Simulation
   [ ] No

3. Please list program names which are in a usable state.
   1, CARSIM (Manual Transmission)
   2, APS (Automatic Transmission)

   195
4. Is your program(s) available for public use?

[ ] Yes

[X] No

5. Is the program(s) described in any publicly available technical publications?

[ ] Yes

[ ] No

6. Can your simulation program in some manner simulate or predict performance of:

[X] Heat-engine vehicles

[ ] Electric vehicles

[ ] Hybrid vehicles

[ ] All of the above

[ ] None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:

The programming language used: FORTRAN IV

The computer(s) it runs on: Xerox Sigma, CDC 6000, IBM 360

The approximate number of source code cards: 1, 630; 2, .

The approximate number of routines: 1, 5; 2, 40

Core storage requirements: 1, 32 K Bytes; 2, =54 K Bytes

8. Your simulation program(s) is:

[X] Well documented

[ ] Partially documented

[ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?

[X] Yes

[ ] No
10. Is your simulation program(s) designed for:
   - [x] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [x] EPA urban
   - [x] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other Sinusoidal road; level road of constant speeds 0-90 sec. acceleration

12. Can JPL use this data in a survey report for the Department of Energy?
   - [x] Yes per conversation with Michael Orchowski on 2/7/78.
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [x] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes Who?
   - [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   General Motors (GPSIM)

---

197
EVC, Inc.
Attn: Mr. Strumpell
9016 Aviation Blvd.
Inglewood, CA 90301

Dear Sir:

The Jet Propulsion Laboratory (JPL) has been requested by the Department of Energy to conduct a survey of automotive-performance simulation capability within the United States and, in particular, electric and hybrid vehicle performance simulation capability within the industry and government sectors. The results will be published and made available to the public.

Attached is a questionnaire designed to give JPL a brief indication of your automotive performance simulation capability. The questions are yes/no or multiple-choice types which will convey information to JPL with a minimum expenditure of your time. The questionnaire should require approximately 10 minutes to complete.

Please help us by indicating your answers to the questions and returning the questionnaire in the self-addressed, stamped envelope provided. Your prompt response will be greatly appreciated.

It is emphasized that this is a request for information only and does not constitute a commitment, implied or otherwise, that JPL will take any procurement action. JPL or the Government cannot be responsible for any cost incurred in furnishing this information.

Very truly yours,

O. Figueroa, Supervisor
Flight/Project &
Civil Systems
Procurements

PD:cm

enclosure

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NOV 17 1977

Telephone 354-4321
Twx 910-588-3269
Twx 910-588-3294
EVC INC

EVC MOTOR CONTROLLER

EVC - 400 - 600 AMP-1
ISSUED: AUGUST 12, 1977

DESCRIPTION

EVC motor controllers utilize the unique characteristics of a very high current switching transistor which is produced by the Semiconductor Division of EVC, Inc. The primary function of this controller is to smoothly and efficiently control the speed of DC wound field or permanent magnet traction motors from zero to full speed using a chopper circuit.

An unusual feature of the controller is that of current multiplication at low motor speeds, increasing torque and efficiency at start-up and acceleration. Transistor current controllers do not use the complex commutation circuits used in SCR controls. Operating efficiency is at 98% or more throughout the entire control range greatly increasing operating time of battery operated systems.

DESIGN FEATURES

- **Operation**
  Controller transforms high voltage and low current from the battery to a low voltage, high current to the motor resulting in extremely efficient use of the battery.

- **Low Voltage Protection**
  Controller turns off if battery is too low. Circuitry protects from low voltage. Can prevent motor burnouts.

- **Thermal Protection**
  Output current cuts back if overheated.

- **Short/Circuit/Protection**
  Output stops if controller is shorted.

- **Current Limiting**
  Controls maximum battery current. Reduces battery drain.

- **Soft Start**
  Factory set delay circuit makes for more gradual acceleration.

- **Led or Audible Warning**
  Battery condition indicator circuit can operate LED or horn.

SPECIFICATIONS

| Voltage | 12 to *72 VDC |
| Current | 400 to *600 amp models |
| Voltage drop | 1.2 V at 400 amp |
| Weight | 12.5 lbs. |
| Size | 10¾ x 7¾ x 4 |

(*) 300 amp-72v models (plus all 400, 500 and 600 amp models) are double-width.
INSTALLATION

100 or greater amps per horsepower are required. This varies with the load; i.e., weight and grades involved. A motor inductance of at least .5mh is necessary for proper operation.

The series wound motor and most PM motors are ideally suited for operation by the controller. Shunt motors are unsuitable.

Use #4 cable or heavier dependent on lead length and current. Long cables create destructive “spikes”. Keep controller to battery cables to a minimum, preferably less than 36 inches.

It is essential to mount the fins exposed to open air. The controller must dissipate at least one watt per amp during peak load conditions. Should the motor slow after heavy current drain, thermal cutoff has been reached (approximately 70°C), indicating that more cooling is required. A small blower strategically located will alleviate this condition.

An emergency contactor may be added in the battery positive lead but MUST be first on, last off, in relation to the motor contractor/reversing device.

WARNING

MOMENTARY reverse battery connection will PERMANENTLY damage controller. Service battery connections monthly to maintain good contact, as this increases life of system.
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  George E. Jelinek
Your company  Univ. of Colorado
Your company address  ECO T 2-32
Univ. of Colorado
Boulder, Colorado 80309

Your mail stop

Your department  Electrical Engineering
Your title  Professor
Your phone number  492-7003

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes   Name of Program(s) ____________________________
   □ No

3. Please list program names which are in a usable state.
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________

201
Mr. O. Figueroa
Supervisor, Flight Project &
Civil Systems Procurements
Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, California 91103

Dear Mr. Figueroa:

Mr. Walter Cattin of Transportation Systems Division forwarded your questionnaire to me for completion. Engineering Staff developed the GPSIM simulator (and predecessor programs) over a period of more than fifteen years. We maintain the program for all of General Motors, where it is widely used.

I have added some explanatory notes to your questionnaire. You may obtain further details from Dr. Klose and Mr. Heinburger at JPL who have (non-current) documentation.

I hope this information is helpful. We would be willing to provide additional information on GPSIM, provided the inquiry has some reasonable relationship to the business interests of General Motors Corporation. Please address any additional inquiries to Dr. F. W. Bowditch, Environmental Activities Staff, General Motors Technical Center, who coordinates inquiries from organizations such as JPL.

Very truly yours,

D. T. Lewis
Advance Product Engineering

DTL/fk
enc.

cc: C. E. Scheffler
    F. W. Bowditch
    C. Marks
    W. J. Cattin
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ____________________________ D. T. Lewis

Your company __________________________ General Motors Corporation

Your company address ____________________ Advance Product Engineering

______________________________________ General Motors Engineering Staff

______________________________________ General Motors Technical Center, Warren, Michigan 48090

Your mail stop _________________________ APE/2-E

Your department _________________________ Advance Product Engineering

Your title ______________________________ Sr. Staff Project Engineer

Your phone number ______________________ (313) 575-1153

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   X No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   X Yes Name of Program(s) _______________ GPSIM
   □ No

3. Please list program names which are in a usable state,
   ________________ GPSIM

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4. Is your program(s) available for public use?
- Yes
- No

We have previously supplied GPSIM to the Department of Transportation, and to the National Research Council of Canada. We would be willing to discuss the implications of this question.

5. Is the program(s) described in any publicly available technical publications?
- Yes
  - SAE 720043 (Jan. 1972)
- No

6. Can your simulation program in some manner simulate or predict performance of:
- Heat-engine vehicles
  - Any engine which can be represented with data tables, including gas turbines with time delays due to gas dynamics. For electric vehicles, battery effects are estimated after simulation to simplify computation and limit costs (quite successful).
- Electric vehicles
- Hybrid vehicles
  - Program extensions might be required for hybrid engines using energy storage (batteries, etc.), but flywheel hybrids have been simulated successfully.
- All of the above
- None of the above

(Please define your meaning of "Hybrid".)

7. Please describe your program(s) in terms of:

   The programming language used
   - PL/I

   The computer(s) it runs on
   - IBM 370/145 and up

   The approximate number of source code cards
   - 300,000

   The approximate number of routines
   - 90 compileable modules

   Core storage requirements
   - 430 K bytes min. variable (uses dynamic storage)

8. Your simulation program(s) is:
- Well documented
- Partially documented
- Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
- Yes
- No

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10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☒ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☒ EPA urban
☒ EPA highway
☒ Some or all SAE J227 schedules
☒ Other. All GM, any USA-specified schedules

12. Can JPL use this data in a survey report for the Department of Energy?

☒ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☒ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☒ Yes Who? Dr. Gerhard Klose

☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
Mr. O. Figueroa  
Flight Project &  
Civil Systems  
Procurements  

Dear Mr. Figueroa:

In accordance with your request of 11 November 1977 to complete a Vehicle Simulation Questionnaire, the attached completed questionnaire is transmitted.

Our work involves the testing of electric vehicle batteries; therefore, simulation programs are important to us. The list that you are compiling will be most helpful. May we request that a preliminary copy be mailed to us so that we can have the advantage of this information as soon as possible.

Sincerely yours,

Fred Hornstra  
Group Leader,  
National Battery Test Laboratory  

FH/sb  
Enclosure
Please provide the following information:

Your name  William H. DeLuca

Your company  Argonne National Laboratory

Your company address  9700 S. Cass Ave
                       Bldg. 205
                       Argonne, Ill. 60439

Your mail stop

Your department  Chemical Engineering Div.

Your title  E.E.

Your phone number  312-739-7711  Ext. 5889

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - ☑ All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - ☑ Yes  Name of Program(s) Electric Vehicle Simulation Program
   - [ ] No

3. Please list program names which are in a usable state.
   - EVSP

---------------------------------------------
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4. Is your program(s) available for public use?

☐ Yes
☒ No

5. Is the program(s) described in any publicly available technical publications?

☐ Yes
☒ No

6. Can your simulation program in some manner simulate or predict performance of:

☐ Heat-engine vehicles
☒ Electric vehicles
☐ Hybrid vehicles
☐ All of the above
☐ None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:

- The programming language used: FORTRAN for CSMP III (CSSL)
- The computer(s) it runs on: IBM 370-195
- The approximate number of source code cards: 400-500 including data tables
- The approximate number of routines: 5
- Core storage requirements: 200K Bytes maximum for program

8. Your simulation program(s) is:

☐ Well documented
☐ Partially documented
☒ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?

☐ Yes
☐ No
10. Is your simulation program(s) designed for:
   ☑ Batch mode operation
   ☐ Interactive mode
   ☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   ☐ EPA urban
   ☐ EPA highway
   ☑ Some or all SAE J227 schedules
   ☐ Other

12. Can JPL use this data in a survey report for the Department of Energy?
   ☑ Yes
   ☐ No
   ☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   ☑ Yes
   ☐ No
   ☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   ☑ No
   ☐ Yes  Who?

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  Lewis E. Unnewehr
Your company  Ford Motor Co.
Your company address  Research Lab, Rm. 3036
  Box 2053
  Dearborn, MI 48121
Your mail stop  Rm. 3036
Your department  Electrical Systems
Your title  Principal Staff Engineer
Your phone number

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [x] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [x] Yes  Name of Program(s)  all
   - [ ] No

3. Please list program names which are in a usable state.
   - D2F4 - All-electric vehicle
   - P1 - Engine-Battery parallel hybrid vehicle
   - SERHYB - Turbine-Battery series hybrid vehicle
   - FW HYB - Flywheel-Battery hybrid vehicle
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid"). In general, a vehicle with two or more types of energy storage

7. Please describe your program(s) in terms of:
   - The programming language used: Fortran 4
   - The computer(s) it runs on: DEC-10
   - The approximate number of source code cards: (time-sharing)
   - The approximate number of routines: In P1 (the biggest) their are 12 subprograms or subroutines
   - Core storage requirements

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes - P1
   - No
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☒ Interactive mode
☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☒ EPA urban
☒ EPA highway
☐ Some or all SAE J227 schedules
☐ Other: TAXI, UPS, ECE, Ford City, Ford Suburban.

12. Can JPL use this data in a survey report for the Department of Energy?

☒ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☒ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☒ Yes Who? Harvey Frank
☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

Garrett Airresearch, GM, GE, Westinghouse, General Research, Exxon
Please provide the following information:

Your name: Joseph M. Salvaggio

Your company: University of Alabama in Huntsville

Your company address: Box 1347, Huntsville, Alabama 35803

Your mail stop: ________________

Your department: Johnson Environmental & Energy Center

Your title: Research Associate

Your phone number: __________________________

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [x] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [x] Yes
     Name of Program(s) __________________________
   - [ ] No

3. Please list program names which are in a usable state, there programs have been adapted from military application and have no title at such...
4. Is your program(s) available for public use?
   - Yes [x]
   - No [ ]

5. Is the program(s) described in any publicly available technical publications?
   - Yes [ ]
   - No [x]

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles [x]
   - Electric vehicles [x]
   - Hybrid vehicles [ ]
   - All of the above [ ]
   - None of the above [ ]

(Please define your meaning of "Hybrid"). Combination of two or more methods for producing power for an automobile.

7. Please describe your program(s) in terms of:
   - The programming language used: FORTRAN IV
   - The computer(s) it runs on: UNIVAC 1108
   - The approximate number of source code cards: 1200
   - The approximate number of routines: 7
   - Core storage requirements: 60K

8. Your simulation program(s) is:
   - Well documented [ ]
   - Partially documented [ ]
   - Not too well documented [x]

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes [ ]
   - No [x]
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [X] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [X] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [X] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes
   - [ ] No
   - [X] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   [Handwritten note: "Chrysler Corporation - Developed under a Government Contract"]
Please provide the following information:

Your name Frederick T. Elder
Your company Elder Engineering
Your company address 7788 Cherry Wood Verona, Wi 53593
Your mail stop
Your department
Your title Owner
Your phone number 608-836-3969

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [x] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s)
   - [x] No

3. Please list program names which are in a usable state.
   Computer Design and Simulation of a Hydraulic Hybrid Vehicle Power Train

More information is available should you desire it for your use. Please write if you want sample outputs, etc.
4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   - The programming language used: Fortran V
   - The computer(s) it runs on: UNIVAC
   - The approximate number of source code cards: 850
   - The approximate number of routines: 2
   - Core storage requirements: 25,000

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No

   In a digitized format.
10. Is your simulation program(s) designed for:
   [x] Batch mode operation
   [ ] Interactive mode
   [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [x] EPA urban
   - [x] EPA highway
   - [x] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   [x] Yes
   [ ] No
   [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   [x] Yes
   [ ] No
   [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   [ ] Yes Who?
   [ ] No
   [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   Professors Peachley & Frank
   University of Wisconsin
   Madison, Wi
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  Don P. Wilson
Your company  Lester Equipment Mfg. Co., Inc
Your company address  2840 Coronado St
                       Anaheim, Ca 92806

Your mail stop  N/A
Your department
Your title  Pres.
Your phone number (714) 630-2260

If your company does not have an automotive simulation program, go to question 15.
We are manufacturers of Battery Chargers & DC Power Supplies

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes  Name of Program(s)
   □ No

3. Please list program names which are in a usable state.

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name    Harold H. Valentine
Your company  NASA-LeRC
Your company address   21000 Brookpark Road
                        Cleveland, OH 44135
Your mail stop  500-125
Your department  Systems Analysis & Assessment Office
Your title       Section Head - Propulsion Systems Analysis
Your phone number FTS 294-6347

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   XX All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   XX Yes Name of Program(s) Vehicle Fuel Economy Program
   □ No

3. Please list program names which are in a usable state.
   Same as above

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4. Is your program(s) available for public use?
   [ ] Yes
   [XX] No

5. Is the program(s) described in any publicly available technical publications?
   [ ] Yes
   [XX] No

6. Can your simulation program in some manner simulate or predict performance of:
   [XX] Heat-engine vehicles
   [ ] Electric vehicles
   [XX] Hybrid vehicles
   [ ] All of the above
   [ ] None of the above

   (Please define your meaning of "Hybrid".) Heat Engine - Flywheel

7. Please describe your program(s) in terms of:
   The programming language used: Fortran
   The computer(s) it runs on: IBM 360, Univac 110
   The approximate number of source code cards: 1000
   The approximate number of routines: 10
   Core storage requirements: ?

8. Your simulation program(s) is:
   [ ] Well documented
   [XX] Partially documented
   [ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   [ ] Yes
   [XX] No
   221
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☒ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☒ EPA urban
☒ EPA highway
☒ Some or all SAE J227 schedules
☐ Other

12. Can JPL use this data in a survey report for the Department of Energy?

☒ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☒ Yes A listing of the program was sent to JPL early in November through the Electric Vehicle Office. We have discussed our program previously with Don Heimburger of JPL.
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☒ Yes Who? Don Heimburger
☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.


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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name	 W. H. Fengler
Your company	 Meteor Research Ltd.
Your company address	 29440 Calahan Road,
                           Roseville, Michigan, 48066.
Your mail stop	 23651 Fordson Drive, Dearborn, Mich. 48124
Your department	 Manufacturing Engineering
Your title	 General Partner
Your phone number	 (313) 779-6800 & 562-7629

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes Name of Program(s)________________________
   □ No

3. Please list program names which are in a usable state.


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Please provide the following information:

Your name ____________________________
Ernest H Wakefield

Your company ____________________________
Linear Alpha Inc

Your company address ____________________________
1927 Sherman Ave
Evanston Illinois 60201

Your mail stop ____________________________

Your department ____________________________

Your title ____________________________
President

Your phone number ____________________________

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [x] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [x] Yes Name of Program(s) __________ Electric vehicle
   - [ ] No

3. Please list program names which are in a usable state,
   ______________________________________
   ______________________________________
   ______________________________________

   224
4. Is your program(s) available for public use?
   - [ ] Yes
   - [x] No

5. Is the program(s) described in any publicly available technical publications?
   - [ ] Yes
   - [ ] No

6. Can your simulation program in some manner simulate or predict performance of:
   - [ ] Heat-engine vehicles
   - [x] Electric vehicles
   - [ ] Hybrid vehicles
   - [x] All of the above
   - [ ] None of the above

(Please define your meaning of "Hybrid"). Double energy source

7. Please describe your program(s) in terms of:
   - The programming language used: Fortran
   - The computer(s) it runs on: 
   - The approximate number of source code cards: 8 inches
   - The approximate number of routines: 
   - Core storage requirements: Use CDC 6600

8. Your simulation program(s) is:
   - [x] Well documented
   - [ ] Partially documented
   - [ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - [ ] Yes can be accommodated
   - [ ] No
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☒ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☐ Other any can be accommodated

12. Can JPL use this data in a survey report for the Department of Energy?

☒ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☐ Yes
☐ No
☒ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes Who?
☒ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

__________________________________________

__________________________________________

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Please provide the following information:

Your name: B. T. Macauley/E. J. Peters/D. H. Anderson

Your company: Ford Motor Company

Your company address: New Concepts Research Department
                  Scientific Research Lab. - Room S-1055
                  Dearborn, Michigan 48121

Your mail stop: 

Your department: K0507 - New Concepts Research Department

Your title: 

Your phone number: 32-29345/59-41563/32-21504

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [] All government funding
   - [X] Some government funding
   - [] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [X] Yes
   - [] No

   Other

3. Please list program names which are in a usable state.
   - . VEHBASIC (Perf.)
   - . NEWD2.F4 (Electric Vehicle P & E)
   - . VEHIPERF (Perf.)
   - . CVRT (Fortran Economy)
   - . P1 (Electric Hybrid P & E)
4. Is your program(s) available for public use?

☐ Yes
☒ No

5. Is the program(s) described in any publicly available technical publications?

☐ Yes
☒ No

6. Can your simulation program in some manner simulate or predict performance of:

☐ Heat-engine vehicles
☐ Electric vehicles
☐ Hybrid vehicles
☒ All of the above
☐ None of the above

(Please define your meaning of "Hybrid". ) Vehicle has on-board 2 or more separate but integrated propulsion systems.

7. Please describe your program(s) in terms of:

The programming language used Basic, Fortran & Structured Fortran

The computer(s) it runs on DEC-10 & Honeywell 6000

The approximate number of source code cards Unk.

The approximate number of routines Unk.

Core storage requirements Unk.

8. Your simulation program(s) is:

☐ Well documented
☐ Partially documented
☒ Not too well documented per telephone call by D. A. Heimburger 3/21/78 to B. Macauley

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?

☒ Yes Some can.
☐ No

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10. Is your simulation program(s) designed for:

- [x] Batch mode operation
- [ ] Interactive mode
- [x] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

- [x] EPA urban
- [x] EPA highway
- [x] Some or all SAE J227 schedules
- [ ] Other: SAE Driving Cycle and Corporate Cycles

12. Can JPL use this data in a survey report for the Department of Energy?

- [x] Yes
- [ ] No
- [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

- [x] Yes: Willing to discuss capability.
- [x] No: Not willing to discuss program details.
- [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

- [ ] Yes: Who?
- [x] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

G.M., Chrysler, AMC, TECO, Aerojet - General, G.E., Eaton  
(Based upon publically available information)
Please provide the following information:

Your name: D. L. Ivey, Assistant Director
Your company: Texas Transportation Institute
Your company address: Texas A & M Univ., College Station, Texas
Your mail stop: NA
Your department: NA
Your title: Assistant Director & Head Highway Safety Research Center
Your phone number: 713 845 1711

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [X] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [X] Yes
   - [ ] No

3. Please list program names which are in a usable state.
   - Same as above.

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4. Is your program(s) available for public use?
   □ Yes
   □ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   □ All of the above
   □ None of the above

(Please define your meaning of "Hybrid"). Propulsion derived from unlike sources of power.

7. Please describe your program(s) in terms of:
   The programming language used __________________________
   The computer(s) it runs on ______________________
   The approximate number of source code cards ______________________
   The approximate number of routines ______________________
   Core storage requirements ______________________

8. Your simulation program(s) is:
   □ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   □ Yes ______________________
   □ No ______________________
10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above
   None of above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other
   N.A.

12. Can JPL use this data in a survey report for the Department of Energy?
   ✔ Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   ☒ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes Who? ____________________________
   ☒ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
Please provide the following information:

Your name: L. F. (WALDOE)

Your company: TRAFALGAR, LTD

Your company address: 4109 JACKSON RD.
ANN ARBOR, MICH. 48103

Your mail stop

Your department

Your title

Your phone number: 313-769-3033

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes Name of Program(s)

☐ No

3. Please list program names which are in a usable state,

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4. Is your program(s) available for public use?
   [ ] Yes
   [ ] No

5. Is the program(s) described in any publicly available technical publications?
   [ ] Yes
   [ ] No

6. Can your simulation program in some manner simulate or predict performance of:
   [ ] Heat-engine vehicles
   [ ] Electric vehicles
   [ ] Hybrid vehicles
   [ ] All of the above
   [ ] None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   The programming language used
   The computer(s) it runs on
   The approximate number of source code cards
   The approximate number of routines
   Core storage requirements

8. Your simulation program(s) is:
   [ ] Well documented
   [ ] Partially documented
   [ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   [ ] Yes
   [ ] No
10. Is your simulation program(s) designed for:

- [ ] Batch mode operation
- [ ] Interactive mode
- [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

- [ ] EPA urban
- [ ] EPA highway
- [ ] Some or all SAE J227 schedules
- [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?

- [ ] Yes
- [ ] No
- [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

- [ ] Yes
- [ ] No
- [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

- [ ] Yes Who?
- [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

We have used GM's simulated program as well as the University of Michigan's.

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January 3, 1978

Mr. O. Figueroa, Supervisor  
Flight Project & Civil Systems  
Procurements  
Jet Propulsion Laboratory  
California Institute of Technology  
Pasadena, California 91103

Dear Mr. Figueroa:

Some time ago you addressed a request for information concerning simulation programs to the General Motors Research Laboratories. We use a large number of simulation programs for varied purposes and I have attached three separate responses to your inquiry.

Sincerely,

Joseph B. Bidwell  
Executive Director

Attach. I
Please provide the following information:

Your name: Paul T. Vickers

Your company: Research Labs, G.M. Corp.

Your company address: 12 Mile & Mound Roads

Warren, MI 48090

Your mail stop: 

Your department: Engine Research

Your title: Asst. Dept. Head

Your phone number: (313) 575-2993

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [x] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [x] Yes Name of Program(s): GPSIM
   - [ ] No

3. Please list program names which are in a usable state,
   - GPSIM

   237
4. Is your program(s) available for public use?
   □ Yes
   □ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   □ All of the above
   □ None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   The programming language used
   □ PL/1
   The computer(s) it runs on
   □ IBM 370/168
   The approximate number of source code cards
   □ 2 boxes
   The approximate number of routines
   □ 50
   Core storage requirements
   □ 500K

8. Your simulation program(s) is:
   □ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   □ Yes
   □ No
   238
10. Is your simulation program(s) designed for:
   - [X] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [X] EPA urban
   - [X] EPA highway
   - [X] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [X] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [X] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [X] Yes

   Who? [Signature] STEPHENSON, ET AL
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

____________________________________________________

____________________________________________________

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VEHICLE
SIMULATION
QUESTIONNAIRE

Please provide the following information:

Your name John S. Collman

Your company General Motors Research Laboratories

Your company address Warren, Michigan 48090

Your mail stop

Your department Power Systems

Your title Department Head

Your phone number 313-575-3144

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [X] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [X] Yes Name of Program(s) SI Engine/Flywheel Hybrid
   - [ ] No

3. Please list program names which are in a usable state.
   Single shaft gas turbine/CV transmission (of many types)
   Split flow compressor - single hshaft gas turbine
   SI Engine/flywheel hybrid
   Dual shaft gas turbine/torque converter
   Gas turbine electric hybrid
   SI electric hybrid

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4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid".) More than one power source

7. Please describe your program(s) in terms of:
   - The programming language used: **FORTRAN**
   - The computer(s) it runs on: **IBM**
   - The approximate number of source code cards
   - The approximate number of routines
   - Core storage requirements

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [X] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [X] EPA urban
   - [X] EPA highway
   - [X] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [X] Yes per conversation with John Collman on 2/7/78
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [X] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [X] Yes Who? S. G. Liddle, formerly of GMR
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

   ______________________________________________________
   ______________________________________________________

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name       Tsih C. Wang

Your company    General Motors Corporation

Your company address General Motors Research Laboratories
    Warren, Michigan  48090

Your mail stop

Your department Electrical Engineering

Your title      Assistant Head

Your phone number (313) 575-3119

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☒ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☒ Yes       Name of Program(s)   EVSIM

☐ No

3. Please list program names which are in a usable state.

EVSIM

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4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   - The programming language used: PL/I
   - The computer(s) it runs on: IBM 370
   - The approximate number of source code cards: 1500
   - The approximate number of routines: 7
   - Core storage requirements: <= 267K bytes

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☒ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☒ EPA urban
☒ EPA highway
☒ Some or all SAE J227 schedules
☐ Other ____________________________

12. Can JPL use this data in a survey report for the Department of Energy?

☒ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☒ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes Who? ____________________________
☒ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

General Electric, Ford, TRW Systems, etc.
Please provide the following information:

Your name: CECIL E. DIETRICH

Your company: AMERICAN ELECTRIC CAR COMPANY, LECTRA DIVISION

Your company address: 5452 BUSINESS DRIVE
                         HUNTINGTON BEACH, CALIFORNIA

Your mail stop: 5452 BUSINESS DRIVE, HUNTINGTON BEACH, CA. 92649

Your department:

Your title: PRESIDENT

Your phone number: (714) 898-3933 (213) 431-3903

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes Name of Program(s)
   - [ ] No

3. Please list program names which are in a usable state.
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  W. A. Buzzell

Your company  REI

Your company address  1209 Lake Ave.

Lake Worth

Florida  33469

Your mail stop

Your department  Engineering

Your title  Senior Project Engineer

Your phone number  305 - 588 - 1148

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   
   □ All government funding
   
   □ Some government funding
   
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   
   □ Yes  Name of Program(s) see below
   
   □ No

3. Please list program names which are in a usable state.

   Cyclic Simulation of Vehicle Performance

   Steady State Performance Simulation / Vehicle Parametric Sensitivity Study
4. Is your program(s) available for public use?
   □ Yes
   X No

5. Is the program(s) described in any publicly available technical publications?
   X Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   X All of the above
   □ None of the above

   (Please define your meaning of "Hybrid"). A vehicle having a heat engine as a prime mover which is utilized in conjunction with a short term energy storage system (usually electric) to propel the vehicle.

7. Please describe your program(s) in terms of:
   The programming language used _Fortran IV_.
   The computer(s) it runs on _Virtually all larger computers can handle Fortran_.
   The approximate number of source code cards 200
   The approximate number of routines 20
   Core storage requirements 550K

8. Your simulation program(s) is:
   X Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   X Yes
   □ No
10. Is your simulation program(s) designed for:
   - [X] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [X] EPA urban
   - [ ] EPA highway
   - [X] Some or all SAE J227 schedules
   - [X] Other: Any general driving cycle may be input on a point by point basis.
     The cycles indicated, in addition to several others, are already incorporated.

12. Can JPL use this data in a survey report for the Department of Energy?
   - [X] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [X] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [X] Yes
   - [ ] No
   - [ ] Who? ________________________________

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

________________________________________
________________________________________
________________________________________

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Please provide the following information:

Your name: Gerald J. Roth

Your company: Defense Intelligence Agency (DT-1A)

Your company address: Defense Intelligence Agency (DT-1A)

WASHINGTON, D.C. 20331

Your mail stop:

Your department: DT-1A

Your title: Branch Chief/Technology Capabilities Branch

Your phone number: 0X-45860

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes  Name of Program(s)
   - [ ] No

3. Please list program names which are in a usable state.

   __________________________________________
   __________________________________________
   __________________________________________

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10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes Who?
   - [ ] No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   DIA does not have any holdings on US Automotive simulation programs. US state-of-the-art is not followed by DIA
   And we are not aware of any US companies with programs of the sort in which you are interested.

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Please provide the following information:

Your name  Robert Sanders
Your company  Sebring Vanguard Inc.
Your company address  P.O. Box 1419
                      Sebring, FL 33870

Your mail stop
Your department
Your title  Vice President/Operations
Your phone number  613-655-1835

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - [ ] All government funding
   - [ ] Some government funding
   - [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - [ ] Yes  Name of Program(s) ____________________________
   - [ ] No

3. Please list program names which are in a usable state,
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  

Ralph W. Holmes  

Your company  

PRESTOLITE  

Your company address  

PRESTOLITE ELECTRICAL DIVISION  

511 HAMILTON STREET  

TOLEDO, OHIO 43694  

Your mail stop  

Your department  

MECHANICAL SYSTEMS ENGINEERING  

Your title  

Senior Engineer, Electric Vehicle Systems  

Your phone number  

419/244 2811  

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☒ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☒ Yes  

Name of Program(s)  

Electric Vehicle Tractive Performance

☐ No

3. Please list program names which are in a usable state,
4. Is your program(s) available for public use?
   □ Yes
   □ No

5. Is the program(s) described in any publicly available technical publications?
   □ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   □ All of the above
   □ None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   The programming language used
   □ F O R T R A N
   The computer(s) it runs on
   □ I B M VM/370
   The approximate number of source code cards
   The approximate number of routines
   6
   Core storage requirements
   □ 60 K B Y T E S

8. Your simulation program(s) is:
   □ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   □ Yes
   □ No
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [x] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [x] Some or all SAE J227 schedules
   - [x] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [x] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [x] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes
   - [x] No
   - [ ] Maybe

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   ASL, GOleta, CALIFORNIA

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Jet Propulsion Laboratory  
Attn: Mr. O. Figueroa  
4800 Oak Grove Drive  
Pasadena, California  91105

Dear Mr. Figueroa:

   Please excuse the long delay in returning your questionnaire. At the time we received it, we were beginning to develop a program to simulate a heat engine-flywheel-battery hybrid concept that I hoped to describe in our response. It is now running in a simple form.

   We had developed another simulation earlier, primarily for electric vehicles. I have made an extra copy of the questionnaire to make it easier to list the quite different characteristics of these two programs.

   Sincerely yours,

   Ditmar H. Bock

DHB:eb-4  
Enclosure
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name ___________________________ Ditmar H. Bock (or T.R. Sweet)

Your company _______________________ Calspan Corporation

Your company address ___________________________

Box 235

Buffalo, NY

14221

Your mail stop ____________________________

Your department ___________________________ Electronics (Defense Analyzer Systems)

Your title ________________________________ Principal Physicist (Principal Research Engineer)

Your phone number ________________________ (716) 632-7500 X781

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes Name of Program(s) Personal Rapid Transit/Urban Deployability Programs

☐ No

3. Please list program names which are in a usable state.

1. Kinematics 2. Vehicle/Guideway Dynamics


4. Is your program(s) available for public use?
   - Yes
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid".)

7. Please describe your program(s) in terms of:
   - The programming language used: Fortran
   - The computer(s) it runs on: IBM 360/370
   - The approximate number of source code cards: 8000
   - The approximate number of routines: 500
   - Core storage requirements: 800K Bytes (Program #7, Question 3)

8. Your simulation program(s) is:
   - Well documented
   - Partially documented
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes
   - No
   - 258
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☒ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☐ Other

12. Can JPL use this data in a survey report for the Department of Energy?

☒ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☒ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes Who?
☒ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.


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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: Ditmar H. Bock

Your company: Calspan Corporation

Your company address: Box 235
   Buffalo, NY 14221

Your mail stop:

Your department: Electronics

Your title: Principal Physicist

Your phone number: (716) 632-7500 X781

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   X No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   X Yes Name of Program(s) FLETSM (FLET Simulation)
   □ No

3. Please list program names which are in a usable state.
   FLETSM
4. Is your program(s) available for public use?
   [ ] Yes
   [x] No

5. Is the program(s) described in any publicly available technical publications?
   [ ] Yes
   [x] No

6. Can your simulation program in some manner simulate or predict performance of:
   [x] Heat-engine vehicles
   [ ] Electric vehicles Planned
   [x] Hybrid vehicles
   [ ] All of the above
   [ ] None of the above

   (Please define your meaning of "Hybrid"). Heat engine - flywheel -
   electric transmission

7. Please describe your program(s) in terms of:
   - The programming language used: FORTRAN IV
   - The computer(s) it runs on: IBM 360/65
   - The approximate number of source code cards: 150
   - The approximate number of routines:
   - Core storage requirements: 46K

8. Your simulation program(s) is:
   [ ] Well documented
   [x] Partially documented
   [ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   [ ] Yes Planned
   [x] No
   [ ] 261
10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban □ Planned
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other cycles including terrain effects are being run

12. Can JPL use this data in a survey report for the Department of Energy?
   □ Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   □ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes Who?
   □ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
Judith Bevan  
Mail Stop 125-241  
Jet Propulsion Laboratory  
4800 Oak Grove Drive  
Pasadena, CA. 91103  

Dear Ms. Bevan:

Enclosed you will find our completed questionnaire concerning Vehicle Simulation. In addition to this questionnaire, we have had a brief discussion with Phil Chapman, Don Heimburger and Ron Slusser concerning our capabilities, and we left some data with Mr. Chapman concerning specific components used in some of our earlier work.

We appreciate the opportunity to respond to your survey and to demonstrate both our special simulation capabilities and our interest in the EHV program.

Sincerely,

John L. Gunter

Enclosure

cc: Phil Chapman  
    Don Heimburger  
    Ron Slusser
VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name     Dr. John L. Gunter
Your company  Boeing Computer Services
Your company address  Energy Technology Applications Division
                        P. O. Box 24346
                        Seattle, Washington 98124
Your mail stop  38-09
Your department  New Business Development
Your title     Manager
Your phone number  (206) 433-1373

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding   [X]
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes   Name of Program(s)  EASY Program
   - No

3. Please list program names which are in a usable state,
   EASY-EHV
   EASY-SIMWEST

   Note: Flywheel and battery components from SIMWEST given to

   Phil Chapman on 1/24/78
4. Is your program(s) available for public use?
   [X] Yes
   [ ] No

5. Is the program(s) described in any publicly available technical publications?
   [X] Yes* *In Government publications
   [ ] No

6. Can your simulation program in some manner simulate or predict performance of:
   [ ] Heat-engine vehicles
   [ ] Electric vehicles
   [ ] Hybrid vehicles
   [X] All of the above
   [ ] None of the above

(Please define your meaning of "Hybrid".) A combination of two or more power sources with one or more energy storage devices (Power Sources: Electric Motor and other-ICE, etc; Storage Device: Battery and other - FLYWHEEL, etc.)

7. Please describe your program(s) in terms of:
   The programming language used ______ FORTRAN IV (FTN 4.6)
   The computer(s) it runs on ______ CDC 6600/CYBER 175
   The approximate number of source code cards ______ 20,000
   The approximate number of routines ______ 145
   Core storage requirements ______ 100K (Octal) (Moderate sized model)

8. Your simulation program(s) is:
   [X] Well documented
   [ ] Partially documented
   [ ] Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   [X] Yes
   [ ] No

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10. Is your simulation program(s) designed for:
   □ Batch mode operation
   □ Interactive mode
   □ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   □ EPA urban
   □ EPA highway
   □ Some or all SAE J227 schedules
   □ Other ________________________________

12. Can JPL use this data in a survey report for the Department of Energy?
   □ Yes
   □ No
   □ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   □ Yes
   □ No
   □ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   □ Yes  Who? Phil Chapman; Don Heimburger; Ron Slusser
   □ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name  PAUL FANCHER
Your company  UNIVERSITY OF MICHIGAN, HIGHWAY SAFETY RESEARCH INSTITUTE
Your company address  HURON PKWY AND BAXTER RD.
ANN ARBOR, MICHIGAN  48109

Your mail stop

Your department  PHYSICAL FACTORS DIVISION
Your title  RESEARCH SCIENTIST
Your phone number  313 764 2168

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   □ All government funding
   □ Some government funding
   □ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   □ Yes  Name of Program(s)
   □ No  

   (1)  yaw divergence of commercial vehicles
   (2)  Influence of Increased Size and Weight
   (3)  Directional Response of Tractor-Trailer Vehicles

3. Please list programs names which are in a usable state.
   (1) Phase III (a computer based mathematical method for predicting braking performance of Trucks and Tractor-trailers),
   (2) Phase II (--- for predicting the directional response of Trucks and Tractor-trailers),
   (3) Simplified interactive programs called "TBS" and "BRAKES2"
4. Is your program(s) available for public use?

☑ Yes

☐ No

5. Is the program(s) described in any publicly available technical publications?

☑ Yes

☐ No

6. Can your simulation program in some manner simulate or predict performance of:

☐ Heat-engine vehicles

☐ Electric vehicles

☐ Hybrid vehicles

☐ All of the above

☐ None of the above

(Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:

The programming language used: □ FORTRAN IV

The computer(s) it runs on: IBM 370, AMDAHL 490V/6

The approximate number of source code cards: 4720

The approximate number of routines: 35

Core storage requirements: 90K word

8. Your simulation program(s) is:

☑ Well documented

☐ Partially documented

☐ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?

☐ Yes

☑ No
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [X] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [X] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [X] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes
   - [ ] No
   - [ ] Who?

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   - [ ] Cummins Engines

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Please provide the following information:

Your name ____________________________ WILLIAM BAUER

Your company __________________________ WILLIAMS RESEARCH CORPORATION

Your company address ____________________ 2280 W. Maple Road, Walled Lake, Michigan 48088

Your mail stop __________________________ B2-1A

Your department __________________________ Marketing

Your title ________________________________ Chief Applications Engineer

Your phone number ________________________ 624-5200

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).

☐ All government funding
☒ Some government funding
☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☒ Yes Name of Program(s) Automotive Fuel Economy Simulation program
☐ No

3. Please list program names which are in a usable state,

Automotive Fuel Economy Simulation Program


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4. Is your program(s) available for public use?
   - Yes [x]
   - No

5. Is the program(s) described in any publicly available technical publications?
   - Yes [x]
   - No

6. Can your simulation program in some manner simulate or predict performance of:
   - Heat-engine vehicles [x]
   - Electric vehicles
   - Hybrid vehicles
   - All of the above
   - None of the above

   (Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:
   - The programming language used: Fortran IV
   - The computer(s) it runs on: Univac 1108, Honeywell 6607
   - The approximate number of source code cards: 600 cards
   - The approximate number of routines: 4 routines
   - Core storage requirements: 60K words

8. Your simulation program(s) is:
   - Well documented
   - Partially documented [x]
   - Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   - Yes [x]
   - No
10. Is your simulation program(s) designed for:
   - Batch mode operation
   - Interactive mode
   - Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - EPA urban
   - EPA highway
   - Some or all SAE J227 schedules
   - Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - Yes
   - No
   - Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - Yes
   - No
   - Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - Yes
   - No
   - Who?

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
Please provide the following information:

Your name  Patrick M. Miller
Your company  MGA Research Corporation
Your company address  4245 Union Road
                        Buffalo, New York 14225
Your mail stop  ---
Your department  ---
Your title  President
Your phone number  716-634-6950

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   [ ] All government funding
   [x] Some government funding
   [ ] No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   [x] Yes  Name of Program(s)  HVOSM, CVS, CRASH, SMAC
   [ ] No

3. Please list program names which are in a usable state,
   HVOSM - Highway Vehicle Object Simulation Model
   CVS - Crash Victim Simulation
   CRASH - Impact Speed Reconstruction Program
   SMAC - Accident Reconstruction Program
4. Is your program(s) available for public use?
   
   □ Yes
   □ No

5. Is the program(s) described in any publicly available technical publications?
   
   □ Yes
   □ No

6. Can your simulation program in some manner simulate or predict performance of:
   
   □ Heat-engine vehicles
   □ Electric vehicles
   □ Hybrid vehicles
   □ All of the above
   □ None of the above

   (Please define your meaning of "Hybrid"). Propulsion power derived from battery stored energy or conventional heat engine fuels

7. Please describe your program(s) in terms of:
   
   The programming language used__________________________________________________
   The computer(s) it runs on _________________________________________________________
   The approximate number of source code cards_______________________________________
   The approximate number of routines_______________________________________________
   Core storage requirements_______________________________________________________

8. Your simulation program(s) is:
   
   □ Well documented
   □ Partially documented
   □ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   
   □ Yes
   □ No
   □ X No
10. Is your simulation program(s) designed for:
   - Batch mode operation
   - Interactive mode
   - Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - EPA urban
   - EPA highway
   - Some or all SAE J227 schedules
   - Other... Can be programmed to simulate all of the above modes of operation.

12. Can JPL use this data in a survey report for the Department of Energy?
   - Yes
   - No
   - Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - Yes
   - No
   - Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - Yes Who?
   - No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.
   - Calspan Corporation

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VEHICLE SIMULATION QUESTIONNAIRE

Please provide the following information:

Your name: PHIL CHAPMAN
Your company: JPL Propulsion Laboratory
Your company address: 4800 Oak Grove Dr.
PASADENA, CA 91103

Your mail stop: 198-220
Your department: ELECTROCHEMICAL POWER GROUP
Your title: TASK AREA MANAGER, VEHICLE SYSTEMS MODELING AND SIMULATION
Your phone number: (213) 354-7693

If your company does not have an automotive simulation program, go to question 15.

1. Indicate the funding source of your simulation program(s).
   - All government funding
   - Some government funding
   - No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?
   - Yes
     - Name of Program(s): ELECTRIC AND HYBRID VEHICLE SYSTEM RESEARCH AND DEVELOPMENT PROJECT (DOE)
   - No

3. Please list program names which are in a usable state?
   - PARAMET

---

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4. Is your program(s) available for public use?
   ☑ Yes
   ☐ No

5. Is the program(s) described in any publicly available technical publications?
   ☑ Yes
   ☐ No

6. Can your simulation program in some manner simulate or predict performance of:
   ☑ Electric vehicles
   ☐ Heat-engine vehicles
   ☐ Hybrid vehicles
   ☐ All of the above
   ☐ None of the above

   (Please define your meaning of "Hybrid").

7. Please describe your program(s) in terms of:

   The programming language used: **Fortran IV**
   The computer(s) it runs on: **IBM 370**
   The approximate number of source code cards: 2000
   The approximate number of routines: 19
   Core storage requirements: source & object 4940, object code only 1330

8. Your simulation program(s) is:
   ☑ Well documented
   ☐ Partially documented
   ☐ Not too well documented

9. If your simulator(s) can accommodate hybrid vehicles and/or heat-engine vehicles, can it accept emission maps?
   ☑ Yes
   ☐ No
10. Is your simulation program(s) designed for:
   - [ ] Batch mode operation
   - [ ] Interactive mode
   - [ ] Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:
   - [ ] EPA urban
   - [ ] EPA highway
   - [ ] Some or all SAE J227 schedules
   - [ ] Other

12. Can JPL use this data in a survey report for the Department of Energy?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?
   - [ ] Yes
   - [ ] No
   - Who? MODELING & SIMULATION TASK AREA TEAM

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

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Please provide the following information:

Your name ____________________________

Darryl L. Kane

Your company ___________________________

National Motors Corporation

Your company address ______________________

Post Office Box 1523

Lancaster, Pennsylvania 17601

Your mail stop ____________________________

Your department __________________________

Your title ________________________________

President

Your phone number _________________________

(717) 299-7349

If your company does not have an automotive simulation program, go to question 15.

REFER TO COMMENTS UNDER "15"

1. Indicate the funding source of your simulation program(s).

☐ All government funding

☐ Some government funding

☐ No government funding

2. Are you currently using any of your simulation programs for some type of vehicle study?

☐ Yes Name of Program(s) __________________________

☐ No

3. Please list program names which are in a usable state.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
10. Is your simulation program(s) designed for:

☐ Batch mode operation
☐ Interactive mode
☐ Both of the above

11. If your simulator(s) accommodates any SAE or Federal driving schedules, please indicate which ones:

☐ EPA urban
☐ EPA highway
☐ Some or all SAE J227 schedules
☐ Other

12. Can JPL use this data in a survey report for the Department of Energy?

☐ Yes
☐ No
☐ Maybe (A "maybe" will be considered a "no" until resolved)

13. Are you willing to discuss your simulation program(s) further with a JPL survey team?

☐ Yes
☐ No
☐ Maybe

14. Have you discussed your simulation program(s) previously with JPL personnel?

☐ Yes  Who?

☐ No

15. Please list other U.S. companies you know with automotive performance simulation programs of any type.

NMC is in possession of a well documented program which should be capable of predicting the performance of electric, hybrid and I/C powered vehicles. As yet the program has not been tested although it has been de-bugged by others.

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December 14, 1977

Mr. O. Figueroa
Supervisor, Flight Project &
Civil Systems Procurements
Jet Propulsion Laboratories
4800 Oak Grove Drive
Pasadena, Ca 91103

Dear Mr. Figueroa:

Your undated form letter concerning automotive performance simulation capabilities has been received. In accordance with the filled out simulation questionnaire, you will see that we do not have an automotive simulation program.

However, with regard to question 15, we believe that there is an automotive performance simulation program at:

Mechanical Technology, Inc.
968 Albany-Shaker Road
Latham, N.Y. 12110

I have been involved in two vehicles, an all-electric and a hybrid described in the enclosed papers. We predicted the performances of both the electric and the hybrid by reference to well known electrical and automotive phenomenon. The performances came very close to the predicted values.

I hope this is of some help.

Very truly yours,

mc/11621
encls: 690454
760123

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