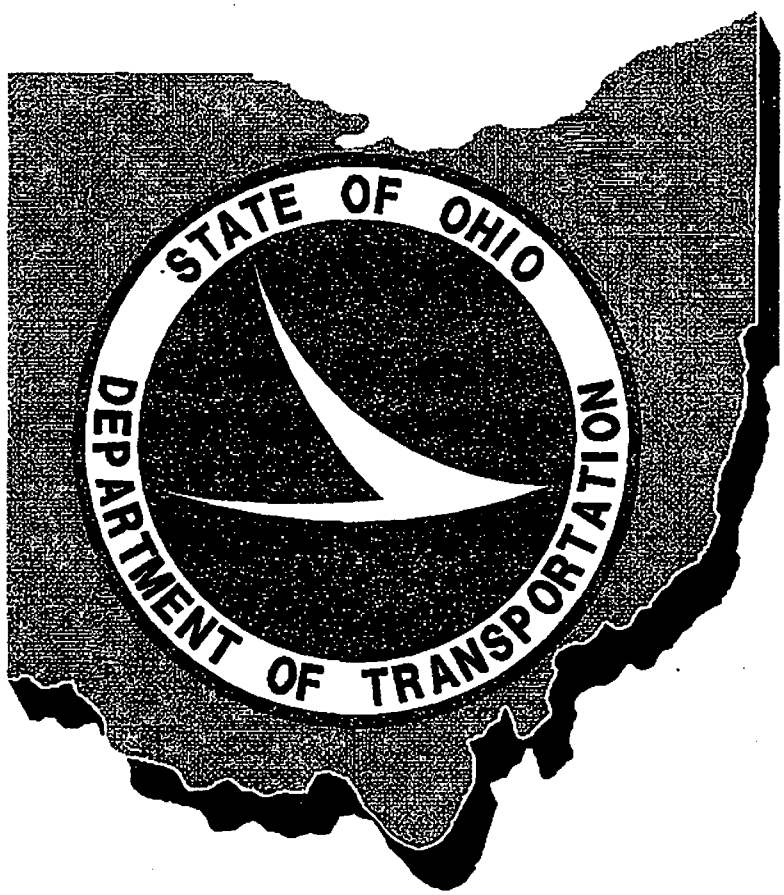
# MULTI-STATE STUDY
# " APPLICATION OF GLOBAL POSTIONING SYSTEM (GPS) "
# FOR TRANSPORTATION PLANNING





## OHIO DOT

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The Ohio State University

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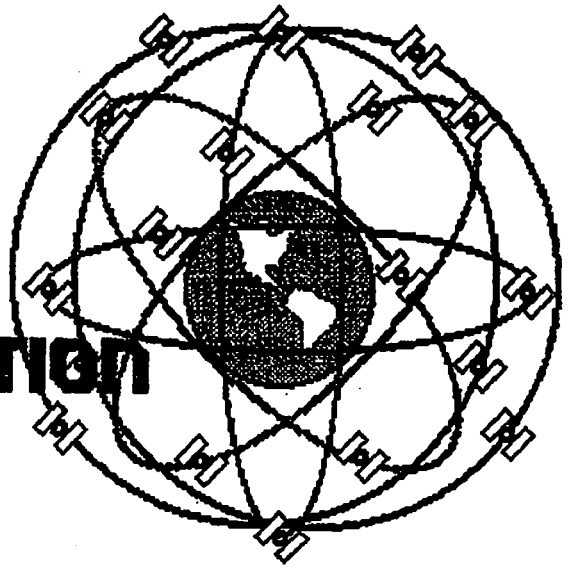
# GPS FOR TRANSPORTATION AGENCIES



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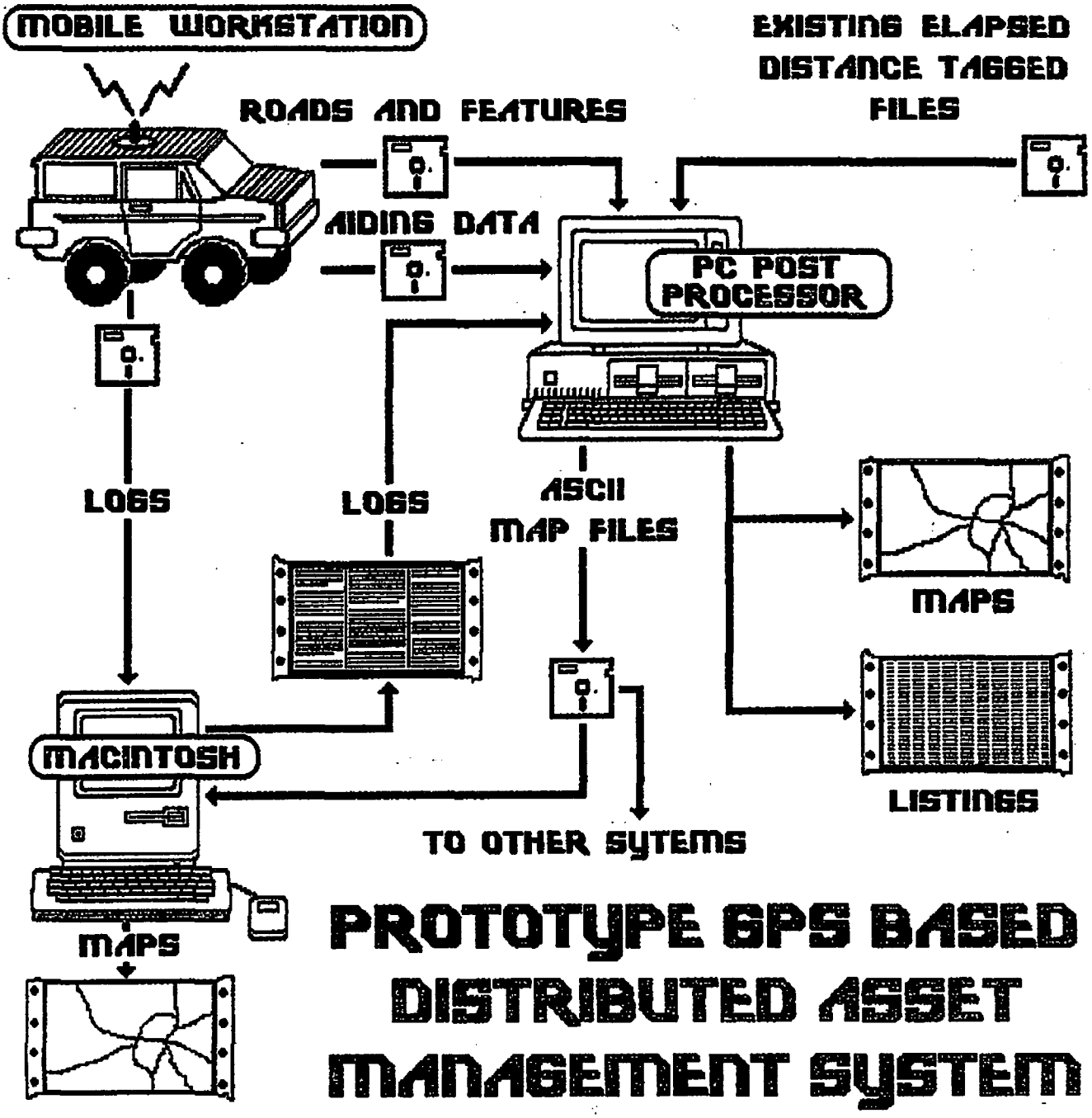
Since late 1986, GPS, as an new element in computer systems, has evolved from a raw idea into a working, end to end prototype comprised of a vehicle, a standard single channel GPS receiver, a collection of micro-computers and a variety of other hardware and software. The prototyping activity has demonstrated that GPS time and place tagged input streams are powerful and practical new tools for geographic information system users. This work has also helped bring to light the improvements and enhancements that are needed to create a flexible, operational, first generation GPS/GIS which will meet the needs of both users and suppliers.




# PROTOTYPE GPS BASED DISTRIBUTED ASSET MANAGEMENT SYSTEM

## GPS - A NEW TOOL FOR COMPUTER USERS

GPS is one of those rare technology jewels with the potential for stimulating fundamental change in the way that computers are used. Global Positioning Satellites is being placed in orbit primarily to meet the need for very accurate global navigation of military vehicles. In the long term, however, the time and place "tags" contained in GPS broadcasts, when incorporated into computer data base input, will have a real productivity benefit to information users which may match or exceed the navigation benefits of these satellites. GPS time and place tags can make a reality out of the much talked about "vehicle tracking" market. More immediately, the largest impact of GPS is apt to be in systems which support the management of the thousands of static or relatively static assets such as roads, bridges, crop areas, timber tracts, toxic waste dumps and the like which are strewn across the national and international landscapes.

## IMPLEMENTATION CONSORTIUM

GPS has been a well known technology for several years and since the shoot down of the KAL 007 airliner in the early 1980's, it has been available (at no fee) for non-military applications. Strangely, there has been no rush by either computer users or computer suppliers to take advantage of this powerful new tool. This may be due to the current dilemma in the information sciences where many American technologists don't know users and user requirements, where many American users don't know technologists and technologies. This situation where almost nobody is building the end to end capability has parallels in other fields.

On January 6, 1989 the Washington Post addressed this in an editorial entitled "The Super (conductor) Bowl" from which the following quote is extracted.

"..... Currently American manufacturers seem to be losing the semiconductor market to their Japanese competitors. How can the United States prevent that from happening to the future products based on superconductors"

"The White House put that question to a committee of scientists and industrialists headed by Ralph E. Gomory of IBM, and the committee has now given an answer with implications far beyond this one technology. It recommends setting up several consortia centered on universities and bring in experts from both government laboratories and private industry to work on research programs on which they all agree. Companies would contribute to the cost, in return fro which they would take part in directing the research." (emphasis added)

Completion of the work started by Rockwell in its programs in Tennessee and Virginia is proposed as the substance of the technical work of such a consortium. A variety of technical issues, including (but not limited to) overall system architecture, internal and external interfaces, response to selective availability, aided GPS, input editing and smoothing, data base creation and management, end user workstations, mobile workstation design, and standards of performance need to be addressed addressed and solved if a GPS/GIS is to live up to its potential.

One specific objective here is to take advantage of the enforced hiatus in the use of GPS caused by the Challenger disaster to implement, using the consortium technique, an operational GPS/GIS. The short and moving daily window of GPS satellite availability is quite adequate for system development but it is not suited for routine operational use of a GPS based system.

Two to three public highway agencies (state, county, or city) in reasonably close proximity to each other should be selected and encouraged to become members of the consortium. An effort should be made to include a range of institutional structures, geographic terrain, and urban and rural settings in order to have an area and a range of environments in which the emerging system can be adequately tested.

The kinds of systems that could result from the efforts of this kind of consortium are directly applicable to an extremely broad range of distributed asset management problems - highway transpor-

tation, marine charts, aeronautical charts, strip mine operation and reclamation, toxic waste dump management; earthquake and storm response;; flood response and flood plain delineation; agriculture; forestry; public utility facilities management; parks management; acid rain investigations; air quality assessment; surface water management; irrigation; and on and on.

After the creation of adequate data bases has been accomplished, a whole new range of "process control" applications ranging from vehicle tracking, to route planning and monitoring for the shipment of hazardous cargoes, to emergency vehicle dispatch and monitoring, to highway accident reporting, and so on.

## TENNESSEE AND VIRGINIA PROJECTS

The work that has been done over the last two years by Rockwell International and the Departments of Transportation in Tennessee and Virginia concentrated on some very basic applications - map data base generation and the production of thematic management maps. In both cases, the emphasis was on using GPS as a time and place tagged data base generator. In both cases, however, there was an end to end capability that could produce information products real appeal to operational users.

It was the demonstrable end products which helped establish the consensus within TENN DOT that a GPS based system could be very useful tool for managing highway assets. In Tennessee, the ability to produce, in minutes, a five county map showing the location and identification all 350 bridges on state highways became an enormously powerful technology transfer device.

In October, 1986, Rockwell International began to investigate other market potentials for a commercial GPS receiver that had been designed primarily for navigation and time applications. The Challenger accident in January of that year had put a hold on GPS launches and in October, it was apparent that the market for GPS receivers would face a major disruption. Rockwell's intent was to uncover new and large GPS demands that did not require the 24 hour availability demanded in navigation applications.

Rockwell's decision to concentrate on highway applications was not accidentally arrived at. The broad guidelines were that the initial application had to be something in general use all over the countryand it had to be an application area where major investments were being made. Most importantly, it had to be "doable" without new invention and the investigationhad to be possible within the constraints of a moving, four hour daily window of satellite availability.

## TRANSPORTATION, THE FIRST APPLICATION

Selecting highways became an easy call.

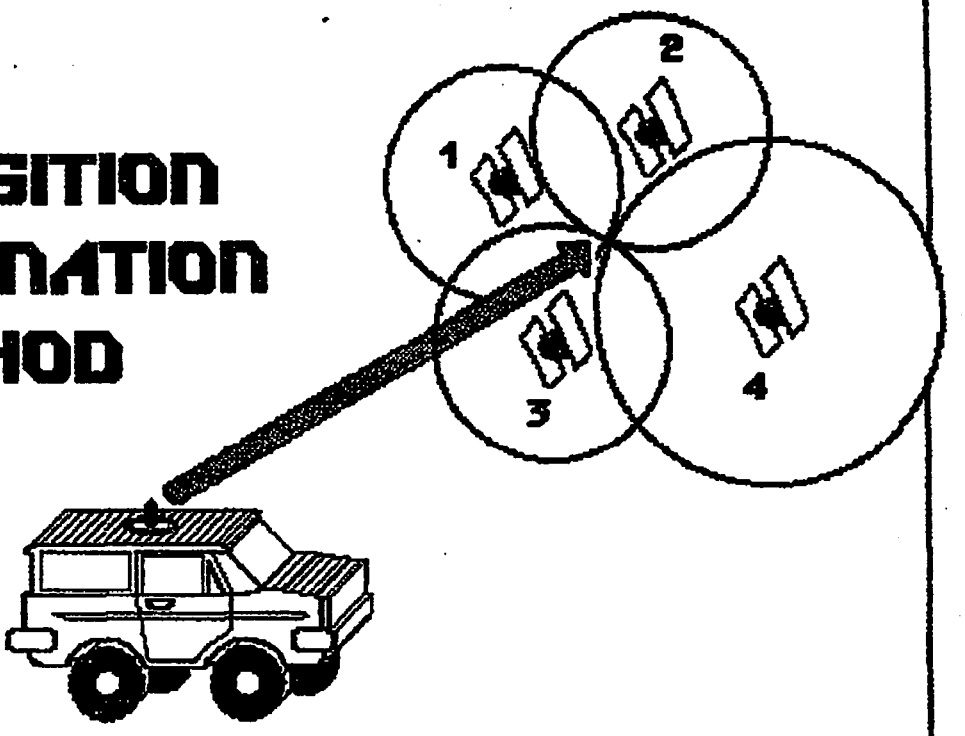
*) Highway departments are the very essence of the national infrastructure problem. They are responsible for nearly 4 million miles of road and related assets spread out over 3.5 million square miles of real estate.

*) The "related (distributed) assets" include hundreds of different kinds of things ranging from road surfaces to bridges, shoulders, signs, traffic signals, roadway markings, culverts, railroad crossings, ramps and cloverleafs, barriers, construction equipment, buildings, vehicles and many more things spread out over the same vast area. The investment in all these assets is almost beyond calculation.

*) With the completion of the interstate system (and, coincidentally, an ever increasingly obvious need for major repairs to the interstates) highway departments have begun a slow shift from pouring concrete to more closely managing their existing system of roads.

*) There are fifty state highway agencies, over 3000 county highway agencies, more than 500 larger city highway agencies and major highway activity. At the federal level , the Department of Transportation, the Department of the Interior, the Department of Agriculture and in the civil works activities of the US. Army Corps of Engineers have requirements similar to those of state

# GPS POSITION DETERMINATION METHOD




## ROAD INVENTORY WORKSTATION

*The GPS position determination method is based on the principle that the position of an object can be determined by measuring the distance from it to three or more objects (in this case satellites) whose position is known.*

*Each GPS satellite continually broadcasts describing data that describes its exact position relative to the earth at an precise instant in time that is measured measured in nanoseconds.*

*The Navcore I receiver in the mobile workstation is equipped with its own clock which allows it to determine, once each second, the "pseudo range" between it and each of three or four satellites needed generate a three dimensioned position fix. The pseudo range is an approximate distance arrived at by multiplying the elapsed time of the satellite message (determined by the receiver clock) by the speed of light, 186,000 miles per second.*

*Any error in the synchronization of the satellite and receiver clocks will affect the accuracy of the pseudo range.*

*To reduce any effect of non-synchronized clocks, the receiver also calculates the distance to a fourth satellite so that the receiver clock can be reset to exactly match the satellite clock. By computing clock offset as well as three dimensioned position, the receiver can correct for variations in the velocity of the radio signals which it receives from the satellites. All this, of course, is happening continuously in a mobile workstation moving a traffic speeds on any class of road from city street to interstate highway.*

*The result is an accurate set of "tags" in digital format of latitude, longitude, elevation, and time once every second. Unlike elapsed distance tags, which are usually a string of interdependent measurements beginning at some arbitrary point, each set of GPS coordinates is an independent calculation of location on the face of the earth. In the Tennessee and Virginia projects, GPS coordinates were used to plot segments of roads and locations of point items to within 30-50 feet of accuracy as described by a sample of geodetic benchmarks.*

transportation departments.

*) The "data base" applications related to road lead directly to road "process control" applications such as accident location reporting, hazardous cargo routing, or emergency (911) vehicle dispatch and tracking.

*) Highway applications also ripple out to the railroad, water and air transportation applications that exist in state highway departments.

*) Transportation department applications create the essential data bases needed to begin to address the same kinds of demands in other state agencies - Education, Health, Environment, Agriculture, Commerce, etc.

## TENNESSEE AND VIRGINIA RESULTS

Over the next 27 months, Rockwell and its consultants were engaged in joint development programs with the Departments of Transportation in Tennessee and Virginia. During the course of these two programs, working prototypes of a mobile data acquisition workstation, a post processing configuration of microcomputers with specially designed software, and eventually a full end to end capability for displaying and plotting output products were fabricated and extensively used. Sixty one van/days were spent during this time in acquiring data needed to locate complete roads, segments of roads and point items along roads in both Tennessee and Virginia. The field equipment operated in summer and winter, in rain, snow, electrical storms, on days when the temperature was below zero and on days when the temperature was well above 100 degrees.

Beginning at absolute point zero where the DOT participants knew nothing about GPS and the Rockwell staff knew nothing about highway applications, over the two year period, these programs became useful models for the introduction of complex, new technologies. In addition, the empirical and documented experience in the Rockwell program can be an extremely useful guide to the further effort needed to design and implement a operational set of GPS based information tools.

The Tennessee and Virginia programs demonstrated a variety of things.

* GPS based data acquisition is a natural and extremely effective input front end for Geographic Information Systems (GPS/GIS, as it is used here, refers to a system which combines these two information sciences) GPS coordinates are unique fingerprints which can locate points and features with a two dimensioned accuracy to within 50 feet on the surface of the earth. GPS extremely precise time tag, when used with coordinates, becomes an absolute identifier of GIS transactions.

* Although not specifically demonstrated because of the limitations of currently available mapping software, the application analysis showed that three dimensioned graphic presentations of transportation assets will be an extremely attractive new information tool to many transportation managers.

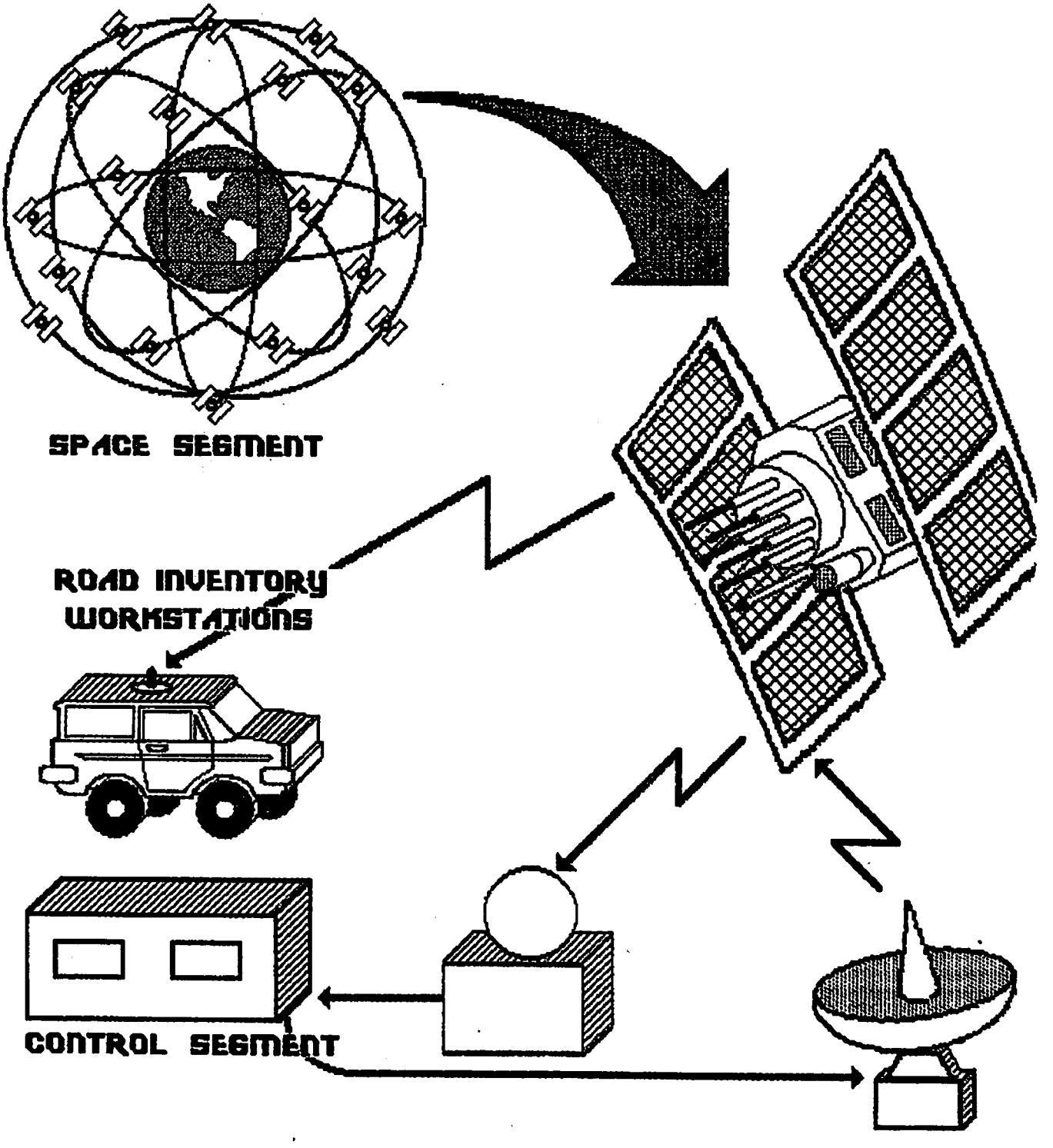
* To be successful, a program of this type has to proceed from the beginning of the information process to the creation of a useful end product.

* The benefits of having knowledgeable and creative user personnel - functional experts - as part of a application team are too varied and too numerous to list here. One undeniable benefit is that a joint effort helps to keep both users and suppliers from making the "gridlock" mistakes which so frequently plague first generation attempts to use a new technology.

*. The development of a cadre of technically informed users has to be one of the end results of a joint development project. In the absence of such a cadre, a joint development is apt to become an entirely sterile process which will die as soon as the user development team leaves.

* A cadre of technically informed users is the fountain from which applications ripples flow. People who know both the application and the technology are the very best base from which to

# GPS SYSTEM CONCEPT

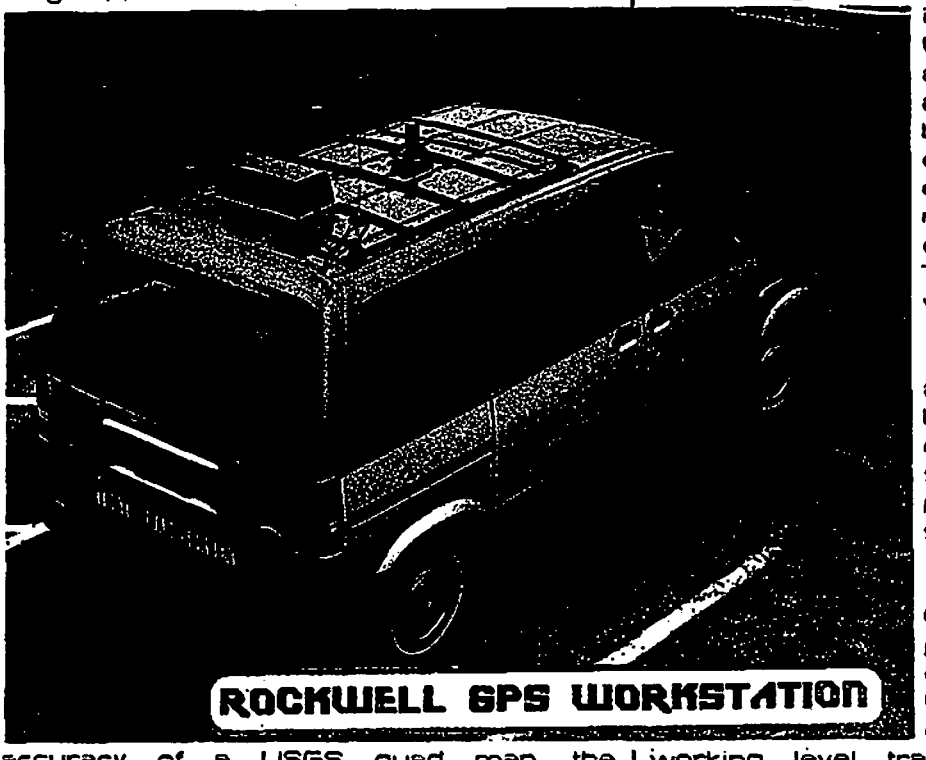


expand the uses of a GPS based geographic information system.

* The programs demonstrated, again, that joint development programs and procurement activities are entirely different undertakings. A development effort has to have the latitude to explore dead ends.

* The Tennessee and Virginia projects demonstrated that a new information system cannot presume to change the user institution, it can't impose any requirement for any alteration of management method, and it cannot impose new programming or operational loads on installed computers. Improvements and benefits have to be *demonstrated* and the process by which these benefits and improvements were created has to be all but invisible to the user organization.

* Minimally aided GPS CA code can be used to create a map base ideally suited for transportation network planning applications since it matches the accuracy of a USGS quad map, the standard map base for DOT's. In most cases, it also produces a much more current and much more accurate base than any method currently available. New approaches to GPS aiding offer the potential for addressing project level applications.



ROCKWELL GPS WORKSTATION

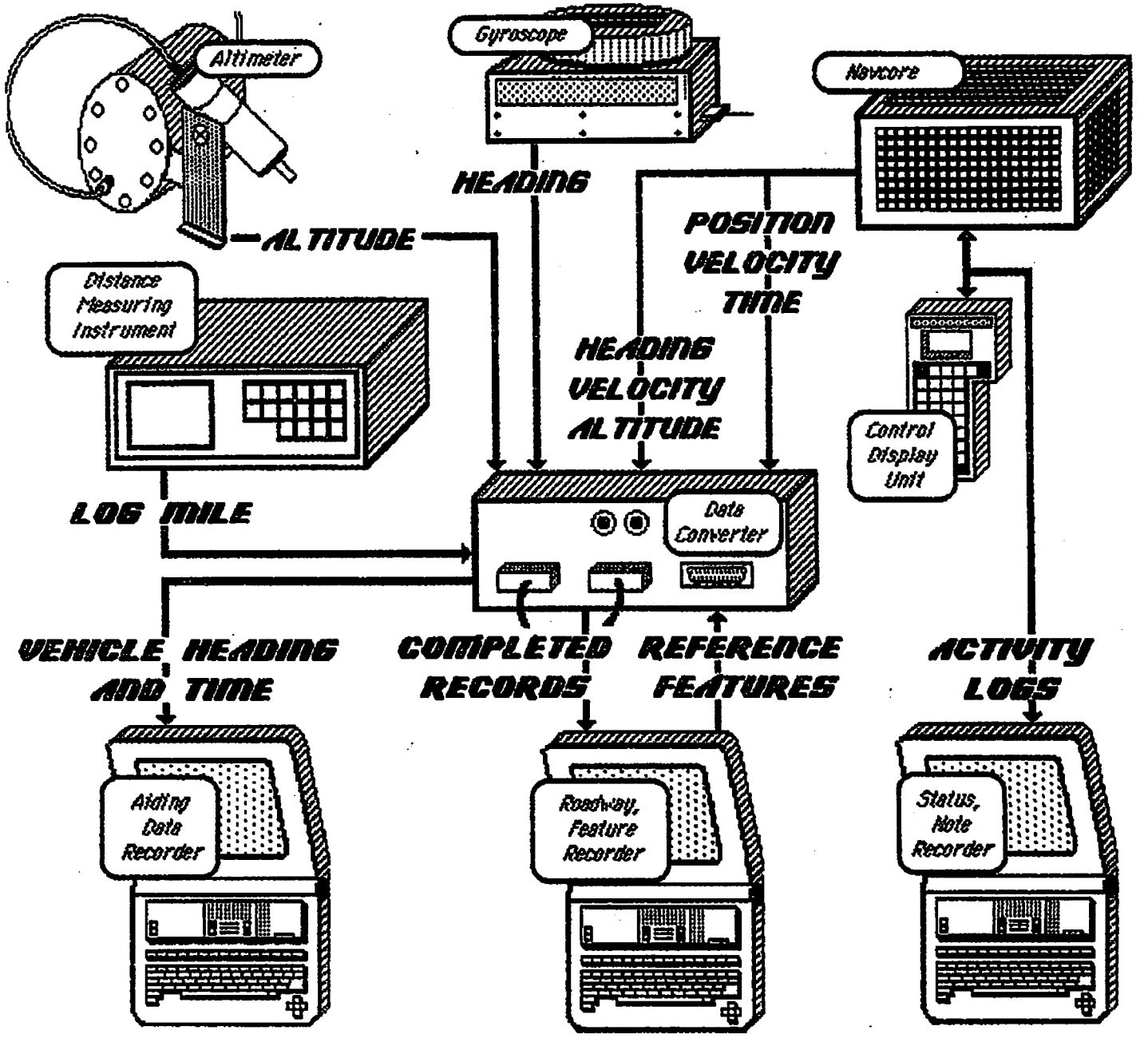
* In Transportation Departments, the production of road maps is an essential base application for a GPS/GIS. By far, the bigger "mapping" activity which goes on in transportation agencies is the production of hand colored road maps which convert into graphic form, the computer listings which describe specific highway assets - bridges, for example. The production of these "management" maps consumes thousands of man hours each year. In a demonstration sample, this application was automated in the Rockwell project.

* The automation of "smart" input streams, which is implicit in the GPS method, can provide very large productivity improvement either hand digitizing or digital map scanning.

* Migration of very large existing, elapsed distance tagged files into a GIS compatible graphic mode becomes a very straight forward process by matching these elapsed tags to similar tags which are a part of the road alignment files created by the GPS system. Included here are files created by automated road condition surveyors such as Tennessee's ARANS van.

* There are other applications which can best be supported by off-road mobile workstations, with a man pack as one class of such workstations.

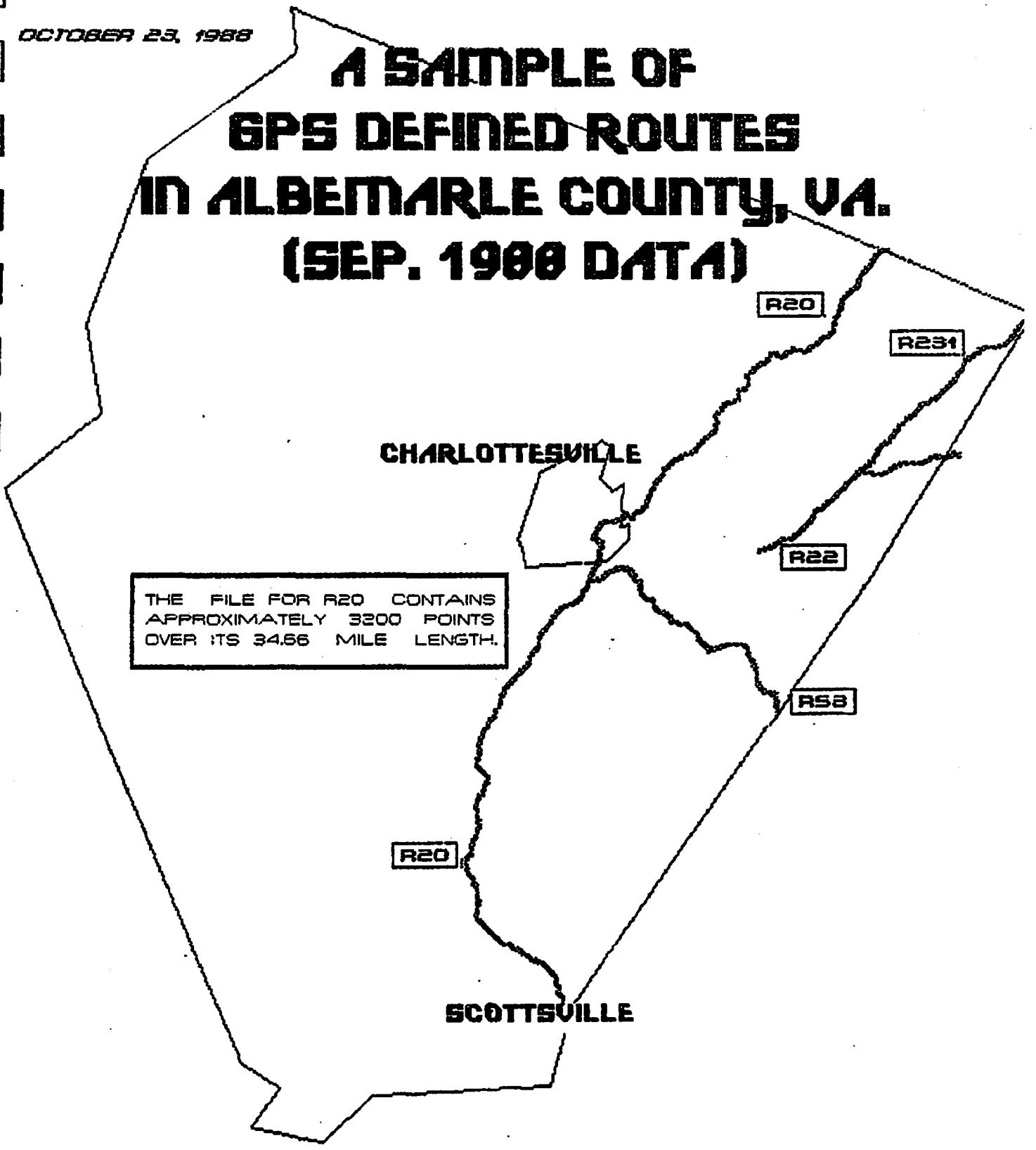
* An operational GPS/GIS for DOT applications has to be easy for transportation managers to rely on, it has to be easy for working level transportation people to use, it has to be able to grow to accommodate growing and changing end requirement - and if it is to be accepted, its design, standards and implementation must include the direct participation of transportation agencies and peopl.




Over a two year pperiod, Rockwell's GPS mobile workstation became a complex prototype data acquisition sub-system consisting of a number of computers, sensors, other hardware, and special purpose and other software which were linked together in a mobile, functionally distributed network. The mobile unit and its related post processing work station demonstrated that accurate and complete records of segments and point items (consisting of descriptions, cordinate position tags, precise time tags, and elapsed distance locations) can be generated at traffic speeds in the range of road environments from flatlands to mountains. Daily calibration of all equipment was an essential, and rigorously observed quality assurance procedure at the beginning and at the end of every field data acquisition session.

OCTOBER 23, 1988

# A SAMPLE OF GPS DEFINED ROUTES IN ALBEMARLE COUNTY, VA. (SEP. 1988 DATA)




*THIS MAP CONTAINS ROCKWELL NAVCORE ROAD ALIGNMENT INVENTORY DATA CONVERTED BY MAPMAKER 3.0 SOFTWARE ON A MACINTOSH PLUS COMPUTER. THE DATA FOR THE CHARLOTTESVILLE AND ALBEMARLE COUNTY BOUNDARIES IS FROM CENSUS FILES AND IS NOT PRECISE TO NAVCORE STANDARDS.*

## List of current and past research projects

1. Study of RTK technology and support infrastructure suitable for long-range instantaneous, centimeter-level positioning as related to the US NSRS Network, National Geodetic Survey (NGS), September 2002-August 2004

2. Proposal to Acquire Precision Navigation and Positioning Instrumentation System, Department of Defense and the Ohio Board of Regents (Defense University Research Initiative Program, DURIP), April 2002 March 2003.

3. Geo-Referenced Digital Acquisition and Processing System Using LIDAR Technology, Ohio Department of Transportation, May 2002 April 2004.

4. Near Real-Time GPS/LEO Precision Orbit Determination for Operational Weather Forecasting with GPS, NASA NIP, April 2001- March 2004.

5. Multiple Sensor Fusion for Surface Extraction and Robust Geolocation, Department of Defense (DOD) Dual Use Technology (DUST) Program, March, 2000-June, 2003.

6. Remote Sensing Data Acquisition for Traffic Flow Estimates, Federal Department of Transportation (NCRST-F), March 2000-August 2003

7. High-Accuracy Direct Aerial Platform Orientation with Tightly Coupled GPS/INS System, Ohio Department of Transportation, January 2001 October 2002.

8. High Accuracy Dynamic Highway Mapping Using a GPS/INS/CCD System with On-The-Fly GPS Ambiguity Resolution, Ohio Department of Transportation, January 2000-June 2002 (http://www.cfm.ohio-state.edu/research/odot/odot.html)

9. Development of High-Accuracy Geo-referenced Data from Selected Tucson Sites, Federal Department of Transportation (NCRST-F), January 2002-March 2003.

10. *High Accuracy Dynamic Highway Mapping Using a GPS/INS System with On-The-Fly GPS Ambiguity Resolution*, Ohio Department of Transportation, October 1997-Decemebr 1999.

1. Simulation of Descent Imagery Collection for Mars Surveyor Mission with GPS/INS/CCD System, Jet Propulsion Laboratory, 1999.

2. Airborne Digital Mapping of the MIT Campus, Massachusetts Institute of Technology, 1998.

3. DEM Extraction from GPS/INS Geo-referenced High-Resolution Direct Digital Imagery (AIMS), Florida Department of Transportation, 1998.

4. Airborne Integrated Mapping System (AIMS), National Aeronautics and Space Administration (NASA), October 1996-February 1999 (http://www.cfm.ohio-state.edu/research/AIMS/)

5. The Application of Global Positioning System for Transportation Planning, sponsored jointly by the Federal Highway Administration, 38 State Departments of Transportation, and the Defense Mapping Agency (currently NIMA ), 1990-1995, (http://www.cfm.ohio-state.edu/research/gpsvan.html)

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# Center for Mapping



## GPSVan™ Project

The GPSVan™ is a mobile mapping and data collection system that can map rail, highway and the transportation infrastructure (e.g., roads, signs, and bridges) while traveling at normal traffic speed. A Mobile Mapping System (MMS) can be defined as a moving platform, upon which multiple sensor/measurement systems have been integrated, to provide three-dimensional near-continuous positioning of both the platform and simultaneously collected geo-spatial data. The Center for Mapping pioneered this technology, realizing very early that Geographic Information Systems (GIS) require up-to-date and high-quality spatial data to enhance the decision making process in transportation and urban planning. The GPSVan™ ***positioning module*** integrates the Global Positioning System (GPS) in differential mode, and an independent Dead-Reckoning System (DRS) that records the vehicle's position during temporary GPS data outages (satellite signal blockage by trees or other obstructions). The positioning of the vehicle is good to 10 cm when GPS data is available at three-second intervals. GPS data outages of 30 s, 60 s and 120 s cause the positioning degradation to the level of 0.2 m, 0.4 m and 1.0 m, respectively. Additional attributes, i.e., road signs, bridges, etc., can be recorded by a system operator, using a PC keyboard, or the touch screen of the system's portable computer. Below is a sample pair of stereo images. Click To View full-size versions.

An ***imaging module*** of the GPSVan™ consists of a stereo camera system that records stereo images of the roadway, as the van moves down the highway(700k mpeg) . The stereo system is supplemented by an analog camera system, that runs in continuous video mode, and captures a photographic log of the survey. Each video frame is time-tagged with the GPS signal, and geodetic coordinates (i.e., latitude, longitude and ellipsoidal height) are assigned to every image. Digital stereo pairs are processed in a post-mission mode, to determine geodetic coordinates of objects such as road edges and centerlines, curbs, street signs, mile markers, etc., with a relative accuracy of 5-10 centimeters within 10-40 meters from the vehicle. The analog imagery provides an information for urban planners and tax assessors, as well as the real estate and transportation industry. Data collected by the GPSVan™ can be converted into a format compatible with a Geographic Information System (GIS), and used by the rail and transportation authorities to establish management priorities, and control safety features, such as speed limits and location of the warning signs.

This technology, which has been developed over the past five years at the Center for Mapping at The Ohio State University is being extensively exploited for surveying, mapping, and feature inventory applications. One of the most challenging and demanding tasks was the inventory survey of 7,000 miles of track for the Burlington Northern Santa Fe Corporation (BNSF), with submeter accuracy. The results of the BNSF survey represent an unprecedented accomplishment, both in accuracy and in the number of miles surveyed. For over

95 percent of the quality checkpoints, coordinates provided by the GPSVan System were within 50 cm from ground truth. The GPSVan™ System results are better, less expensive, and available much faster than data from any other mapping technology.

The prototype van is available for marketing demonstrations and actual surveys. Second generation vehicles that have the DRS replaced by an Inertial Navigation System (INS) are currently being built and sold for commercial purposes.

# KANSAS DEPARTMENT OF TRANSPORTATION

**REPORT**
**OF THE CURRENT**
**HIGHWAY PLANNING AND RESEARCH,**
**DEVELOPMENT & IMPLEMENTATION PROGRAM**

**PROJECT**

**HPR-PR-0010(11) Statewide**

for the 1989 Fiscal Year
July 1, 1988 through June 30, 1989

**and**

**OF THE FUTURE**
**HIGHWAY PLANNING AND RESEARCH,**
**DEVELOPMENT & IMPLEMENTATION PROGRAM**

**PROJECT**

**HPR-PR-0010(12) Statewide**

for the 1990 Fiscal Year
July 1, 1989 through June 30, 1990

**and a**

**SUMMARY OF THE RELATED**
**HIGHWAY PLANNING AND RESEARCH,**
**DEVELOPMENT & IMPLEMENTATION ACTIVITIES**
**WHICH ARE NOT FUNDED WITH HPR FUNDS**

In cooperation with the
**U.S. DEPARTMENT OF TRANSPORTATION**
**FEDERAL HIGHWAY ADMINISTRATION**

June 1989

FY 1990

## 10. SPECIAL STUDIES

Total Estimated Cost $107,000

### A. National

**(1) Weigh-in-Motion Demonstration Project (RTAP) (P-0533-90)**

Objective

The objectives of this project is to evaluate the performance and demonstrate the benefits of a Weigh-in-Motion program for Kansas.

Accomplishments 1989

Work was accomplished in writing the final report for the RTAP Weigh-in-Motion demonstration project. A draft of the final report is scheduled to be provided to FHWA for their review.

Proposed 1990

Work will come to a close on this project following the final editing, printing and distribution of the Final Report.

Work with WIM equipment will continue in FY 1990 but will shift from a demonstration mode to applications required by the annual Truck Weight Survey and the SHRP. This work will be handled under the category of Truck Weight and Characteristics.

| 1989 Program | 1989 Estimated Expenditures | 1990 Program |
|---|---|---|
| $ 5,000 | $ 1,000 | $ 2,000 |

**(2) Application of Global Positioning Systems (GPS) for Transportation Planning (P-8665-90)**

Objective

To develop economical methods to acquire road alignment and road inventory data items on the ground using GPS technology. The product of the project will be the prototype for an operational system which a) can be cost effectively implemented and used by states, and b) can respond to the use of future information technologies and changes in transportation application needs.

Accomplishments 1989

None. 1990 will be the only monetary participation in this Project.

Proposed 1990

Kansas will participate in the cost of this study.

| 1989 Program | 1989 Estimated Expenditures | 1990 Program |
|---|---|---|
| None | None | $15,000 |

**KANSAS HIGHWAY PLANNING and**
**RESEARCH, DEVELOPMENT & IMPLEMENTATION**
**WORK PROGRAM -- PROJECT**

HPR-PR-0010(12) Statewide
Fiscal Year 1990
July 1, 1989 through June 30, 1990

**SUMMARIES OF ESTIMATED COSTS**
**BY**
**SECTIONS AND SUBSECTIONS**

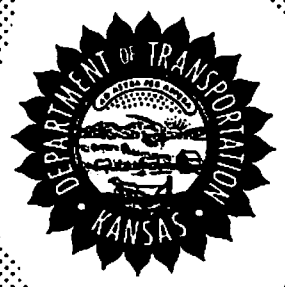
PART I

| | | | AMOUNT | AMOUNT | AMOUNT |
|---|---|---|---|---|---|
| 1. | ADMINISTRATION AND CONTROL | | | | 130,000 |
| | A. | Salaries and Expenses | | 130,000 | |
| 2. | ROAD INVENTORY | | | | 150,000 |
| | A. | Rural and Urban | | 70,000 | |
| | | (1) Rural | 40,000 | | |
| | | (2) Urban | 30,000 | | |
| | B. | Railroad Crossing Hazard Rating | | 30,000 | |
| | C. | Evaluation of Frictional Characteristics of Pavement Surfaces | | 50,000 | |
| 3. | MAPPING | | | | 155,000 |
| | A. | County Mapping | | 90,000 | |
| | B. | Official State Mapping | | 15,000 | |
| | C. | General Mapping | | 10,000 | |
| | D. | City Mapping | | 40,000 | |
| 4. | TRAFFIC | | | | 610,000 |
| | A. | Volume Counts | | 360,000 | |
| | | (1) Continuous Traffic Count Locations | 120,000 | | |
| | | (2) State Highway System and City Connecting Links | 110,000 | | |
| | | (3) County FAS - Rural and City Connecting Links | 50,000 | | |

| | | | AMOUNT | AMOUNT | AMOUNT |
|---|---|---|---|---|---|
| | (4) | Rural Non-State, Non-Federal-Aid Road Coverage | 15,000 | | |
| | (5) | City Coverage - FAU and Non-State, Non-Federal-Aid | 65,000 | | |
| B. | Vehicle Classification and Occupancy | | | 120,000 | |
| C. | Truck Weight and Characteristics | | | 100,000 | |
| D. | Forecasting | | | 25,000 | |
| E. | Special Traffic Studies | | | 5,000 | |
| 5. | HIGHWAY STATISTICS | | | | 25,000 |
| A. | Mileage | | | 20,000 | |
| B. | Motor Vehicles, Operators and Fuels | | | 1,000 | |
| C. | Finance | | | 4,000 | |
| 6. | ECONOMIC AND FISCAL | | | | 45,000 |
| A. | Highway Construction Records | | | 45,000 | |
| 7. | SYSTEMS AND PROGRAMMING | | | | 702,000 |
| A. | Highway Classification and Systems | | | 50,000 | |
| B. | Highway Needs | | | 240,000 | |
| | (1) | Control Section Database (State Highway System) | 90,000 | | |
| | (2) | Rural and Urban Needs, Performance and Investment Analysis | 10,000 | | |
| | (3) | Highway Performance Monitoring System Data Submittal | 50,000 | | |
| | (4) | Bridge Data System | 60,000 | | |
| | (5) | City Classified Database (Non-State Systems) | 30,000 | | |
| C. | Long-Range Program | | | 322,000 | |
| | (1) | Construction Program Development | 320,000 | | |
| | (2) | Highway Safety Improvement Program | 2,000 | | |
| D. | Accident Location Identification | | | 90,000 | |

| | | | AMOUNT | AMOUNT | AMOUNT |
|---|---|---|---|---|---|
| 8. | URBAN TRANSPORTATION STUDIES | | | | 287,000 |
| | A. | Metropolitan Planning Support - General | | 25,000 | |
| | B. | Wichita Area Study | | 55,000 | |
| | C. | Kansas City Area Study | | 60,000 | |
| | D. | Topeka Area Study | | 64,000 | |
| | E. | Lawrence Area Study | | 53,000 | |
| | F. | Areas Under 50,000 Population | | 30,000 | |
| | | (1) Manhattan External O-D Survey | 8,000 | | |
| | | (2) Other Small Urban Areas (5,000 - 50,000 Pop.) Transportation Studies | 22,000 | | |
| 9. | SPEED AND TRAFFIC SERVICE STUDIES | | | | 35,000 |
| | A. | Speed Studies | | 35,000 | |
| 10. | SPECIAL STUDIES | | | | 107,000 |
| | A. | National | | | |
| | | (1) Weigh-in-Motion Demonstration Project (RTAP) (P-0533-90) | | 2,000 | |
| | | (2) Application of Global Positioning Systems for Transportation Planning | | 15,000 | |
| | B. | State | | | |
| | | (1) Statewide Transportation Plan Study | | 90,000 | |
| 11. | RESERVED | | | | 100,000 |
| | TOTAL PART I - PLANNING | | | | $2,346,000 |

# WORK PROGRAM & COST ESTIMATE




## HIGHWAY PLANNING, RESEARCH, DEVELOPMENT AND IMPLEMENTATION

FISCAL YEAR
1991

FY 1991

## 10. SPECIAL STUDIES

Total Estimated Cost $52,000

### A. National

**(1) Weigh-in-Motion Demonstration Project (RTAP)** (P-0533-91)

Objective

The objectives of this project is to evaluate the performance and demonstrate the benefits of a Weigh-in-Motion program for Kansas.

Accomplishments 1990

Work was accomplished in writing the final report for the RTAP Weigh-in-Motion demonstration project. A draft of the final report was prepared and circulated within KDOT for review and comments.

Proposed 1991

Work will come to a close on this project following the final editing, printing and distribution of the Final Report.

Work with WIM equipment will continue in FY 1991 but will shift from a demonstration mode to applications required by the annual Truck Weight Survey and the SHRP. This work will be handled under the category of Truck Weight and Characteristics.

| 1990 Program | 1990 Estimated Expenditures | 1991 Program |
|---|---|---|
| $ 2,000 | $ 1,000 | $ 2,000 |

**(2) Application of Global Positioning Systems (GPS) for Transportation Planning**

Objective

To develop economical methods to acquire road alignment and road inventory data items on the ground using GPS technology. The product of the project will be the prototype for an operational system which a) can be cost effectively implemented and used by states, and b) can respond to the use of future information technologies and changes in transportation application needs.

Accomplishments 1990

Kansas participated in the cost of this study.

Proposed 1991

None. 1990 was the only monetary participation in this project.

| 1990 Program | 1990 Estimated Expenditures | 1991 Program |
|---|---|---|
| $15,000 | $15,000 | None |

# WORK PROGRAM & COST ESTIMATE

## HIGHWAY PLANNING, RESEARCH, DEVELOPMENT AND IMPLEMENTATION

**FISCAL YEAR**

**1992**

**KANSAS DEPARTMENT OF TRANSPORTATION**
**BUREAU OF TRANSPORTATION PLANNING**

FY 1992

## 10. SPECIAL STUDIES

Total Estimated Cost $50,000

### A. National

**(1) Weigh-in-Motion Demonstration Project (RTAP)** (P-0533-92)

Objective

The objective of this project is to evaluate the performance and demonstrate the benefits of a Weigh-in-Motion program for Kansas.

Accomplishments 1991

Work came to a close on this project following the final editing, printing and distribution of the Final Report.

Proposed 1992

Work with WIM equipment will continue in FY 1992 but will shift from a demonstration mode to applications required by the annual Truck Weight Survey and the Strategic Highway Research Program (SHRP). This work will be handled under the category of Truck Weight and Characteristics.

| 1991 Program | 1991 Estimated Expenditures | 1992 Program |
|---|---|---|
| $2,000 | None | None |

**(2) Application of Global Positioning Systems (GPS) for Transportation Planning** (P-8665-92)

Objective

The initial study to develop economical methods to acquire road alignment and road inventory data items on the ground using GPS technology. The product of the project was the prototype for an operational system which a) can be cost effectively implemented and used by states, and b) can respond to the use of future information technologies and changes in transportation application needs.

A "Follow-Up" study is proposed which would enhance the capabilities of this GPS. The study would be primarily directed toward the development of practical applications involving data utilization from the GPS acquisition system and the stereo video images.

Accomplishments 1991

None. Kansas participated in the initial 1990 study.

Proposed 1992

Kansas will participate in the cost of this study.

| 1991 Program | 1991 Estimated Expenditures | 1992 Program |
|---|---|---|
| None | None | $10,000 |

# WORK PROGRAM and COST ESTIMATE

## HIGHWAY PLANNING,RESEARCH, DEVELOPMENT AND IMPLEMENTATION

**FISCAL YEAR**

**1993**

**KANSAS DEPARTMENT OF TRANSPORTATION**
**BUREAU OF TRANSPORTATION PLANNING**

FY1993

STOP HERE

## 10. SPECIAL STUDIES

Total Es

### A. National

**(1) Application of Global Positioning Systems (GI Planning**

Objective

The initial study was to develop economical methods to acquire road alignment and road inventory data items on the ground using GPS technology. The product of the project was the prototype for an operational system which a) can be cost effectively implemented and used by states, and b) can respond to the use of future information technologies and changes in transportation application needs.

A "Follow-Up" study was proposed which was to enhance the capabilities of this GPS. The study was to be primarily directed toward the development of practical applications involving data utilization from the GPS acquisition system and the stereo video images.

Accomplishments 1992

None. Kansas pledged $10,000 toward continuing the original study; however, the study was cancelled.

Proposed 1993

None.

| 1992 Program | 1992 Estimated Expenditures | 1993 Program |
|---|---|---|
| $10,000 | $00,000 | $00,000 |

### B. State

**(1) Statewide Transportation Study** (P-0435-92)

Objective

The objective is to re-examine and, if necessary, redefine state transportation needs and suggest alternatives for maintaining and improving the present facilities and the services they provide. The alternative strategies are analyzed to determine which best meet the goals and objectives of the State within the present and projected social, economic, environmental and political constraints.

Accomplishments 1992

Work was completed on a statewide semi-trailer truck traffic assignment model. A research project, funded by the Midwest Transportation Center and KDOT and conducted by Kansas State University, is using existing O-D data and a variety of commodity data to calibrate trip generation models. Available date and overall direction is being provided by KDOT for the research.

FEDERAL HIGHWAY ADMINISTRATION
FISCAL MANAGEMENT INFORMATION SYSTEM
POOLED-FUND SP & R AND NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
AS OF SEPTEMBER 22, 2010



| STATE | PROG CODE | PROJ. NO. | UNDER AGREEMENT | EXPENDITURE | BALANCE |
|---|---|---|---|---|---|
| CALIF | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| CONN | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| HAWAI | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| LA | 0800 | 0002001 | 30,000.00 | 11,368.44 | 18,631.56 |
| MINN | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| NEV | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| OKLA | 0800 | 0002001 | 10,000.00 | 7,578.96 | 2,421.04 |
| OKLA | 0860 | 0002001 | 5,000.00 | 0.00 | 5,000.00 |
| VA | 0800 | 0002001 | 11,368.44 | 11,368.44 | 0.00 |
| Total: | | | 131,368.44 | 87,158.04 | 44,210.40 |

FEDERAL HIGHWAY ADMINISTRATION
FISCAL MANAGEMENT INFORMATION SYSTEM



## PROJECT FUND HISTORY REPORT

State: KANSAS  Project #: 0002(001) - 0  Program Code: 0800

| Report Date | Expenditures | 102 Expenditures | Federal Funds | Unexpended Balance | St/Local Funds | Private Funds | Nonmonetary Donations | Total Cost | Advanced Construction |
|---|---|---|---|---|---|---|---|---|---|
| Current | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 08/2010 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 07/2010 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 06/2010 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 05/2010 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 04/2010 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 03/2010 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 02/2010 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 01/2010 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 12/2009 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 11/2009 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 10/2009 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 09/2009 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 08/2009 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 09/2008 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 09/2007 | $11,368.44 | $0.00 | $11,368.44 | $0.00 | $0.00 | $0.00 | $0.00 | $11,368.00 | $0.00 |
| 09/2006 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2005 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2003 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2002 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2001 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2000 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/1999 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |

PROJECT RECORD FOR: STATE: **KANSAS** PROJECT NUMBER: **0002(001)** VERSION: CURRENT

PREFIX: HPL

STATE PROJECT NUMBER: 106 P-0665-90

RELATED PROJECT NUMBER:

DESCRIPTION: STATEWIDE, APPLICATION OF GLOBAL POSITIONING SYSTEMS (GPS) for Transportation Planning

STATUS: CLOSED DUNS NUMBER:

SOFTMATCH:

TRANSACTION NUMBER: 0060 BUSINESS MONTH/YEAR: 04/2007

GEOGRAPHIC INFORMATION:

STANDARD PLACE CODE: NA
INVENTORY ROUTE #:
BEGINNING MILEPOINT: 0
ENDING MILEPOINT: 0

OVERSIGHT: N
STIP REFERENCE:

DISASTER FISCAL YEAR:
DISASTER SEQUENCE #:

ENVIR.CLEARANCE: TYPE: 2: CATEGORICAL EXCLUSION
DATE:

PROJECT STATUS DATES

EST. CONST.:
COMPLETED: 04/09/2007
FINAL VOUCHER: 04/09/2007
LAST ACTION: 04/09/2007
LAST PAYMENT: 06/30/1991

AUTHORIZED DATES:

PE:
ROW:
CONST:
HP & R: 12/28/1989
OTHER:
MCSAP:

SPECIAL PROJECT GROUPING:
MAJOR PROJECT:
POOLED FUND PROJECT:

DIVISION DEFINED FIELDS

STATE DEFINED FIELDS:

Toll Credit
Maximum Federal Fund
Tapered Financing

PROJECT FUNDING:

| | | | |
|---|---|---|---|
| EXPENDITURES: | 11,368.44 | TOTAL COST: | 11,368.00 |
| EXPENDITURES 102: | | STATE FUNDS: | |
| TOTAL OBLIGATED: | 11,368.44 | PRIVATE FUNDS: | |
| LOCAL FUNDS: | | ADV. CONST. FUNDS: | |
| NON-MONETARY FUNDS: | | | |

PROJECT RECORD FOR: STATE: **KANSAS** PROJECT NUMBER: **0002(001)** VERSION: CURRENT

PREFIX: HPL

STATE PROJECT NUMBER: 106 P-0665-90

STATUS: CLOSED DUNS NUMBER:

SOFTMATCH:

TRANSACTION NUMBER: 0060 BUSINESS MONTH/YEAR: 04/2007

| | | |
|---|---|---|
| CHANGED BY AND DATE: | KATHY REAMER | 04/09/2007 |

STATE SIGNATURES AND DATES:

| | |
|---|---|
| AVALILABLE FUNDS CERTIFIED: | SIGNATURE ON FILE |
| APPROVAL/RECOMMENDED: | SIGNATURE ON FILE |
| AUTHORIZATION/MODIFICATION: | SIGNATURE ON FILE |

DIVISION SIGNATURES AND DATES:

| | | |
|---|---|---|
| PROJECT INFORMATION REVIEWED: | KATHY REAMER | 04/09/2007 |
| APPROVAL/RECOMMENDED: | KATHY REAMER | 04/09/2007 |
| AUTHORIZATION/MODIFICATION: | JOHN W. EHMEN | 04/09/2007 |

STATE REMARKS:

DIVISION REMARKS:

Final Acceptance granted 19MAR07.

PROJECT RECORD FOR: STATE: **KANSAS** PROJECT NUMBER: **0002(001)** VERSION: CURRENT

PREFIX: HPL

STATE PROJECT NUMBER: 106 P-0665-90

STATUS: CLOSED DUNS NUMBER:

SOFTMATCH:

TRANSACTION NUMBER: 0060 BUSINESS MONTH/YEAR:04/2007

| | | |
|---|---|---|
| PROGRAM CODE: | 0800 | Total |
| RECODE: | 090 | |
| DEMO ID: | | |
| PREFIX: | HPL | |
| LINE NUMBER: | 1 | |
| COUNTY CODE: | 999 | |
| URBAN AREA: | | |
| WITHDRAWAL AREA: | | |
| RURAL/URBAN: | | |
| FUNCTIONAL SYSTEM: | R | |
| FA SYSTEM CODE: | Z | |
| TYPE OF IMPROVEMENT: | 19 | |
| TOLL: | N | |
| SAFETY: | N | |
| TEMPORARY MATCHING: | N | |
| INDIAN RESERVATION: | N | |
| FTA: | N | |
| CONSTRUCTION: | N | |
| DATE OF LAST ACTION: | 03/14/2007 | |
| FHWA AREA: | | |

| PROJECT FUNDING: | | |
|---|---|---|
| PERCENT FEDERAL SHARE: | 0 | |
| TOTAL COST: | 11,368.00 | 11,368.00 |
| FEDERAL FUNDS: | 11,368.44 | 11,368.44 |
| STATE FUNDS: | | |
| LOCAL FUNDS: | | |
| PRIVATE FUNDS: | | |
| NON-MONETARY FUNDS: | | |
| ADV. CONST. FUNDS: | | |
| ADV. CONST. CONV.: | | |
| SOFT MATCH: | | |
| OTHER FEDERAL FUNDS: | | |

STATE DEFINED:

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DIVISION DEFINED:

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:

PROJECT RECORD FOR: STATE: **KANSAS** PROJECT NUMBER: **0002(001)** VERSION: CURRENT

STATE PROJECT NUMBER: 106 P-0665-90

STATUS: CLOSED DUNS NUMBER:

SOFTMATCH:

TRANSACTION NUMBER: 0060 BUSINESS MONTH/YEAR: 04/2007

| PROGRAM CODE | IMPROVEMENT TYPE | BRIDGE NUMBERS |
|---|---|---|

U.S. Department of Transportation
Federal Highway Administration

Kansas Division

6111 SW 29th Street, Suite 100
Topeka, Kansas 66614-4271

March 19, 2007

FINAL ACCEPTANCE OF THREE POOLED FUND PROJECTS

Mr. Jerome T. Younger, P.E.
Assistant Secretary and
State Transportation Engineer
700 SW Harrison
Topeka, Kansas 66603

Dear Mr. Younger:

The projects listed below have been completed and the final vouchers have been processed.

Project HPR-0002(001) State Project 106 P-0665-90
Application of GPS for Transportation Planning

Project HPR-0002(126) State Project 106 RE-0631-01
Integrated Drainage Design Computer System

Project HPR-0002(144) State Project 106 RE-0633-01
Testing of Large and Small Sign Supports

Final acceptance of these projects is granted.

Sincerely yours,

Stephen H. Forest

for J. Michael Bowen, P.E.
Division Administrator

Dick McReynolds, KDOT Dick@ksdot.org
Pam Anderson, KDOT Paman@ksdot.org
Nazhat Aboobaker, FHWA Nazhat.Aboobaker@fhwa.dot.gov
Bill Zaccagnino, FHWA William.Zaccagnino@fhwa.dot.gov
Division Fiscal Files: HPR-0002(001), HPR-0002(126), HPR-0002(144)

MOVING THE AMERICAN ECONOMY

**U.S. DEPARTMENT OF TRANSPORTATION**
**FEDERAL HIGHWAY ADMINISTRATION**
**FEDERAL-AID PROJECT MODIFICATION**



**STATE:** KANSAS **PROJECT NO:**0002(001) **NO:** 2

**STATE PROJ. NO(S):** 106 P-0665-90

**DESCRIPTION:** STATEWIDE, APPLICATION OF GLOBAL POSITIONING SYSTEMS (GPS) for Transportation Planning

**CLASSIFICATION OF PHASE OF WORK:** FVPAID

THE PROJECT AGREEMENT FOR THE ABOVE-REFERENCED PROJECT ENTERED INTO BETWEEN THE UNDERSIGNED PARTIES AND EXECUTED BY THE DIVISION ADMINISTRATOR ON 12/28/1989 IS HEREBY MODIFIED AS FOLLOWS:

| PROGRAM CODE | URBAN/ WITH | | FORMER AMOUNT | REVISED AMOUNT |
|---|---|---|---|---|
| 0800 | | ESTIMATED TOTAL OF PROJECT | $11,368.00 | $11,368.00 |
| | | FEDERAL FUNDS | $11,368.44 | $11,368.44 |
| | | ADV CONSTRUCTION FUNDS | $0.00 | $0.00 |
| | | PERCENT FEDERAL SHARE | 0.00% | 0.00% |

**STATE REMARKS:**

**DIVISION REMARKS:**
Final Acceptance granted 19MAR07.

ALL OTHER TERMS AND CONDITIONS OF THE PROJECT AGREEMENT WILL REMAIN IN FULL FORCE AND EFFECT.

**DEPARTMENT OF TRANSPORTATION**

| | | |
|---|---|---|
| AVAILABLE FUNDS CERTIFIED BY: | SIGNATURE ON FILE | DATE: |
| APPROVAL RECOMMENDED BY: | SIGNATURE ON FILE | DATE: |
| APPROVED AND AUTHORIZED BY: | SIGNATURE ON FILE | DATE: |

**FEDERAL HIGHWAY ADMINISTRATION**

| | | |
|---|---|---|
| APPROVAL RECOMMENDED BY: | KATHY REAMER | DATE: 04/09/2007 |
| APPROVED AND AUTHORIZED BY: | KATHY REAMER | DATE: 04/09/2007 |
| MODIFICATION APPROVED BY: | JOHN W. EHMEN | DATE: 04/09/2007 |

**U.S. DEPARTMENT OF TRANSPORTATION**
**FEDERAL HIGHWAY ADMINISTRATION**
**FEDERAL-AID PROJECT MODIFICATION**



**STATE:** KANSAS **PROJECT NO:** 0002(001) **NO:** 1

**STATE PROJ. NO(S):** 106 P-0665-90

**DESCRIPTION:** STATEWIDE, APPLICATION OF GLOBAL POSITIONING SYSTEMS (GPS) for Transportation Planning

**CLASSIFICATION OF PHASE OF WORK:**

THE PROJECT AGREEMENT FOR THE ABOVE-REFERENCED PROJECT ENTERED INTO BETWEEN THE UNDERSIGNED PARTIES AND EXECUTED BY THE DIVISION ADMINISTRATOR ON 12/28/1989 IS HEREBY MODIFIED AS FOLLOWS:

| PROGRAM CODE | URBAN/ WITH | | FORMER AMOUNT | REVISED AMOUNT |
|---|---|---|---|---|
| 0800 | | ESTIMATED TOTAL OF PROJECT | $15,000.00 | $11,368.00 |
| | | FEDERAL FUNDS | $15,000.00 | $11,368.44 |
| | | ADV CONSTRUCTION FUNDS | $0.00 | $0.00 |
| | | PERCENT FEDERAL SHARE | 0.00% | 0.00% |

**STATE REMARKS:**

**DIVISION REMARKS:**
Final Acceptance granted 19MAR07.

ALL OTHER TERMS AND CONDITIONS OF THE PROJECT AGREEMENT WILL REMAIN IN FULL FORCE AND EFFECT.

**DEPARTMENT OF TRANSPORTATION**

| | | | |
|---|---|---|---|
| AVAILABLE FUNDS CERTIFIED BY: | CHARLES PROTASIO | DATE: | 03/14/2007 |
| APPROVAL RECOMMENDED BY: | CHARLES PROTASIO | DATE: | 03/14/2007 |
| APPROVED AND AUTHORIZED BY: | CHARLES PROTASIO | DATE: | 03/14/2007 |

**FEDERAL HIGHWAY ADMINISTRATION**

| | | | |
|---|---|---|---|
| APPROVAL RECOMMENDED BY: | KATHY REAMER | DATE: | 03/16/2007 |
| APPROVED AND AUTHORIZED BY: | KATHY REAMER | DATE: | 03/16/2007 |
| MODIFICATION APPROVED BY: | STEPHEN H. FOUST | DATE: | 03/19/2007 |

## Foust, Steve

**From:** Foust, Steve
**Sent:** Monday, May 02, 2005 8:57 AM
**To:** Williams, Lisa
**Cc:** 'dick@ksdot.org'; Stevenson, Diana; Low, Byron
**Subject:** Another "Old Dog" PF Study

Hi Lisa,

Need your help again!! We're trying to figure out the status of this old pooled fund study. I looked on the web site but couldn't conjure up any information about it. According to FMIS, the project is still open and there are still funds available. Any info you can find would be appreciated!!

05-05-02--HPL-000
2(001)--GPS-f...

Have a great week!!

Steve Foust
Asst. P&R Engineer
FHWA Kansas Division
3300 S. Topeka Blvd., Suite 1
Topeka, KS 66611
(785)267-7299 Ext. 331
Steve.Foust@fhwa.dot.gov

**Tracking:**

| Recipient | Delivery | Read |
|---|---|---|
| Williams, Lisa | Delivered: 5/2/2005 8:57 AM | Read: 5/2/2005 9:11 AM |
| 'dick@ksdot.org' | | |
| Stevenson, Diana | Delivered: 5/2/2005 8:57 AM | Read: 5/3/2005 11:41 AM |
| Low, Byron | Delivered: 5/2/2005 8:57 AM | Read: 5/2/2005 9:28 AM |

| TO BE COMPLETED BY FHWA | US Department of Transportation<br>Federal Highway Administration | **FEDERAL-AID PROJECT AGREEMENT**<br>P-0665-90 | STATE: Kansas<br>COUNTY: Statewide<br>PROJECT NO.: HPL-2-001 |
|---|---|---|---|

The State, through its Highway Agency, having complied, or hereby agreeing to comply, with the applicable terms and conditions set forth in (1) Title 23, U.S. Code, Highways, (2) the Regulations issued pursuant thereto and, (3) the policies and procedures promulgated by the Federal Highway Administrator relative to the above designated project, and the Federal Highway Administration having authorized certain work to proceed as evidenced by the date entered opposite the specific item of work, Federal funds are obligated for the project not to exceed the amount shown herein, the balance of the estimated total cost being an obligation of the State. Such obligation of Federal funds extends only to project costs incurred by the State after the Federal Highway Administration authorization to proceed with the project involving such costs.

PROJECT TERMINI

Application of Global Positioning Systems (GPS) for Transportation Planning.

| PROJECT CLASSIFICATION OR PHASE OF WORK | EFFECTIVE DATE OF AUTHORIZATION | APPROXIMATE LENGTH *(Miles)* |
|---|---|---|
| HIGHWAY PLANNING AND RESEARCH (HP & R) | 12-28-89 | |
| PRELIMINARY ENGINEERING | | |
| RIGHTS-OF-WAY | | |
| CONSTRUCTION | | |

OTHER *(Specify)*

| FUNDS | |
|---|---|
| ESTIMATED TOTAL COST OF PROJECT | FEDERAL FUNDS |
| $ 15,000.00 | $ 15,000.00 |

The State further stipulates that as a condition to payment of the Federal funds obligated, it accepts and will comply with the applicable provisions set forth on the following pages.

Kansas Department of Transportation
*(Official name of Highway Agency)*

By _____

For: State Transportation Engineer
*(Title)*

By _____

*(Title)*

By _____

*(Title)*

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

By _____ ADMINISTRATIVE MANAGER
*(Division Administrator)*

Date executed by Division Administrator JAN 5 1990

FUNDS AVAILABLE
Initialed by _____

FORM PR-2 (REV. 1-84) PREVIOUS EDITIONS ARE OBSOLETE

# KANSAS DEPARTMENT OF TRANSPORTATION PROJECT AUTHORIZATION AND OBLIGATION

| PROJECT NUMBER | FEDERAL-AID NO. | FUND CLASS | APPN. CODE | CONST. CODE | SAFETY CODE |
|---|---|---|---|---|---|
| P-0665-90 | HPL-2-001 | Highway Planning & Research | 080 | | |

| COUNTY | URBAN AREA | LENGTH MI. |
|---|---|---|
| | | |

ADT: PRESENT FUTURE YEAR

**PROJECT LOCATION**

**CHARACTER OF PROPOSED WORK**

Pooled Fund Study "Application of Global Positioning Systems (GPS) for Transportation Planning"

| WORK PHASE | ESTIMATED PROJECT COST | OBLIGATED BY THIS REQUEST | PREVIOUS OBLIGATION | TOTAL CURRENT OBLIGATION |
|---|---|---|---|---|
| PE | 15,000 | 15,000 | -0- | 15,000 |
| ROW | | | | |
| UTILITY | | | | |
| CONST. | | | | |
| TOTAL | 15,000 | 15,000 | -0- | 15,000 |

**REMARKS:**

100% HPR Funding - FY 1990

DATE December 21, 1989

FOR: W. M. Lackey
STATE TRANSPORTATION ENGINEER

BY: Al Cottam

File No. 740.408

DEC 2 8 1989

Pooled Fund Study
Project HPL-2-001
P-0665-90
DOT Form 130 Dated 12/21/89

Mr. W. M. Lackey
State Transportation Engineer
Kansas Department of Transportation
Topeka, Kansas 66612

Dear Mr. Lackey:

We have obligated $15,000.00 of HPR funds for Project HPL-2-001, "Application of Global Positioning Systems (GPS) for Transportation Planning". The study is being funded with 100% Federal-aid funds. Your participation in this pooled fund study is appreciated. We request a PR-2 for the project.

Sincerely yours,

/s/ Elena A. Aguilar

For Robert J. Deatrick
Division Administrator

EAAguilar:dl

FEDERAL HIGHWAY ADMINISTRATION
FISCAL MANAGEMENT INFORMATION SYSTEM
POOLED-FUND SP & R AND NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
AS OF JANUARY 16, 2004



| STATE | PROG CODE | PROJ. NO. | UNDER AGREEMENT | EXPENDITURE | BALANCE |
|---|---|---|---|---|---|
| ALA | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| ARK | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| CALIF | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| COLO | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| CONN | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| DEL | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| HAWAI | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| IDAHO | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| IND | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| IOWA | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| KANS | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| LA | 0800 | 0002001 | 30,000.00 | 11,368.44 | 18,631.56 |
| MAINE | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| MICH | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| MINN | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| N CAR | 0800 | 0002001 | 10,000.00 | 7,578.96 | 2,421.04 |
| N MEX | 0800 | 0002001 | 18,000.00 | 13,642.12 | 4,357.88 |
| N Y | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| NEBR | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| NEV | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| OKLA | 0800 | 0002001 | 10,000.00 | 7,578.96 | 2,421.04 |
| OKLA | 0860 | 0002001 | 5,000.00 | 0.00 | 5,000.00 |
| PENNA | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| R I | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| S DAK | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| TEXAS | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| VA | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| W VA | 0800 | 0002001 | 10,000.00 | 7,578.96 | 2,421.04 |
| WISC | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| WYO | 0800 | 0002001 | 15,000.00 | 11,368.44 | 3,631.56 |
| Total: | | | 443,000.00 | 320,590.00 | 122,410.00 |

authorized Dec 1989

GPS for transp pl

no activity since April 1996

FEDERAL HIGHWAY ADMINISTRATION
FISCAL MANAGEMENT INFORMATION SYSTEM



## PROJECT FUND HISTORY REPORT

State: KANSAS  Project #: 0002(001) - 0  Program Code 0800

| Report Date | Expenditures | 102 Expenditures | Federal Funds | Unexpended Balance | St/Local Funds | Private Funds | Nonmonetary Donations | Total Cost | Advanced Construction |
|---|---|---|---|---|---|---|---|---|---|
| Current | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 03/2005 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 02/2005 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 01/2005 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 12/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 11/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 10/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 08/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 07/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 06/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 05/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 04/2004 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2003 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2002 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2001 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/2000 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/1999 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/1998 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/1997 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/1996 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/1995 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |
| 09/1994 | $11,368.44 | $0.00 | $15,000.00 | $3,631.56 | $0.00 | $0.00 | $0.00 | $15,000.00 | $0.00 |