SELECTED AMTECH INSTALLATIONS

October 1994

Electronic Toll and Traffic Management Systems

Aberdeen Tunnel (also see "Cross Harbour" and "Lion Rock") — **Hong Kong**

A pilot ETC installation by Amtech and Mitsubishi at the Aberdeen Tunnel in Hong Kong was launched in April 1992; pilot testing began in June 1992, and full-scale implementation began in August 1993. AutoPass Ltd., a joint venture with Cross Harbour Tunnel Co. Ltd. and Amtech, serves as a clearinghouse for customers to establish one account, with one tag, which can be used at three tunnels in Hong Kong.

By September 1993, about 20 percent of Aberdeen Tunnel's traffic used AutoPass, which is installed at four of the tunnel's 12 lanes. Total traffic at the Aberdeen, Cross Harbour and Lion Rock Tunnels is estimated at over 300,000 crossings per day, with approximately 80,000 AVI transactions occurring daily. As of September 1994, 42,000 AutoPass tags have been issued; 150,000 tags are expected to be distributed within the next few years. This system may also be expanded to other tunnels and car parks in Hong Kong.

Autopistas (Acesa/Aucat/Autema/Tabasa), Barcelona — **Spain**

In joint projects with Amtech's international partners Elsydel and IBM, ETC systems were installed on the Barcelona Acesa Highway and the Tabasa Toll Tunnel in Spain in April 1990. The initial installation included four lanes at Acesa and two lanes at Tabasa. Contract extensions were awarded to IBM for additional lanes at Acesa, along with new implementations at Aucat and Autema, for a total of 70 lanes.

The Autopistas is the largest interagency ETC installation in Europe. A customer can use a single tag on all four tollways. Twelve of the lanes are "Presto" AVI dedicated lanes. Tag distribution totals 70,000; an estimated 100,000 tags is projected.

Caminos y Puentes Federales de Ingresos y Servicios Conexos (CAPUFE) — **Mexico**

In April 1992, Amtech announced that Caminos y Puentes Federales de Ingresos y Servicios Conexos (CAPUFE), the federal toll administration for the Republic of Mexico, contracted to install 134 lanes of Amtech AVI equipment on approximately half of all existing toll lanes at 58 locations throughout Mexico. This installation spans nationwide, from Tijuana to the border of Guatemala, and required the coordination of efforts across numerous regional delegations. CAPUFE operates more toll collection points in Mexico than any other authority -- 14 toll roads and 32 bridges, handling over 13 million transactions a month.

Amtech teamed with Integra Ingeniera S.A. de C.V. of Mexico City to provide hardware and software for this automatic toll collection system. Components of the project included plaza computers and lane controllers, traffic control gates, and a vehicle classification system. Installation was completed in April 1993. Phase I was the distribution of 5,000 tags for CAPUFE-exempt vehicles. Phase II will be to tag commercial transportation vehicles. 100,000 tags are expected to be distributed by mid-1996. CAPUFE expects the system to improve the flow of traffic, especially around Mexico City.

Cofiroute **France**

Cofiroute is the only privately owned toll company in France. This heavily traveled highway, covering 730 kilometers (454 miles) in southwestern France, was equipped with 20 reader systems at two toll plazas near Tours. Amtech teamed with Sema Group on this installation, completed in May 1991 with 2,500 tags ordered.

Cofiroute is opening eight new lanes around Tours and is discontinuing its magnetic tollcard subscription in favor of electronic tags. Cofiroute is also considering the Amtech system for other Cofiroute highway projects in various parts of the world.

Crescent City Connection, New Orleans, Louisiana **USA**

In January 1989, Amtech installed its toll system on all 12 lanes of the Crescent City Connection spanning the Mississippi River at New Orleans for the Louisiana Department of Transportation and Development. The project was the first 100 percent implementation of AVI across all lanes. Three of the lanes on the bridge are dedicated tag-only lanes that include traffic control gates.

With Amtech's assistance, the Department implemented a TollTag Distribution Center in New Orleans. More than 34,000 tags have been issued by the Department as of June 1994. Of the 70,000 average daily transactions, more than 21,000 are AVI. During rush hour, 96 percent of tag users have used the dedicated lanes.

Regional multi-agency compatability allows these same tags to be used on the Lake Pontchartrain Causeway in New Orleans.

Cross Harbour Tunnel (also see "Aberdeen" and "Lion Rock") **Hong Kong**

Along with the Aberdeen Tunnel, the Cross Harbour Tunnel in Hong Kong began ETC operations in August 1993. Although they are independent operations, the Cross Harbour, Aberdeen, and Lion Rock Tunnels use the same AutoPass tag. Autopass Ltd., a joint venture with Cross Harbour Tunnel Co. Ltd. and Amtech, serves as a clearinghouse for customers to establish one account, with one tag, to use at the three tunnels.

ETC is installed at four of Cross Harbour Tunnel's 16 lanes, with an additional lane ready to be switched on when demand warrants. Total traffic at the Cross Harbour, Aberdeen and Lion Rock Tunnels is estimated at over 300,000 crossings per day, with approximately 80,000 AVI transactions occurring daily. As of September 1994, 42,000 AutoPass tags have been issued; 150,000 are expected to be distributed within the next few years. Expansion of tag use to other tunnels and car parks in Hong Kong is being considered.

Dallas North Tollway, Texas Turnpike Authority, Dallas, Texas **USA**

The Dallas North Tollway was the first toll road in the U.S. to incorporate ETTM. It is an excellent example of the benefits of Amtech's automatic toll collection system. The system was installed under a private/public-participation agreement (build/operate/transfer) between the Texas Turnpike Authority and Amtech. The project included design, manufacture, and installation of all host, plaza and lane computers, interface to existing equipment, and implementation of tag store operations.

On August 1, 1989, full implementation of ETC for 60 lanes (10 plaza computers) of the tollway was completed. Due to its enormous success, the Texas Turnpike Authority implemented four tag-only lanes as an added benefit for tag users in November 1990. After only two weeks of being in effect, more than 11,000 daily transactions were registered in just these four lanes. Amtech installed equipment for 28 more lanes, of which two are tag-only, constructed as part of a highway extension and opened in September 1994.

As of June 1994, more than 90,000 TollTags have been issued. An average of 85,000 AVI transactions out of nearly 300,000 occur each day. Patrons enjoy convenience, decreased traffic back-up, and shortened commuter time due to the Amtech system.

Esterel-Cote d'Azur Toll Agency (ESCOTA) **France**

ESCOTA serves as a major link to cities along the French Rivera for thousands of commuters each day and is the first truly commercial electronic toll collection system in Europe, implemented in January 1991. Amtech teamed with Elsydel to install 62 lanes on this 250 kilometer (155 miles) of highway near the city of Antibes in southern France.

Three of the lanes are "Presto" AVI dedicated lanes, and two lanes are AVI dedicated only (not high-speed). The remaining 57 lanes are "mixed" lanes. Average daily transactions total 360,000, with about 40,000 being AVI. About 45,000 tags have been distributed.

A unique benefit available to tag users is a direct interface with the national Minitel service, which enables users to directly check their balance accounts and current registered tag transactions, as well as request electronic funds transfers from their bank to tag accounts. Other tag-related operations, such as reporting stolen or lost tags, can also be directly transferred to the toll authority from the user's home terminal.

GA-400, Atlanta, Georgia **USA**

Lockheed IMS chose Amtech to provide ETC and closed circuit (CCTV) systems, and install a majority of the subsystems including vehicle classification and video enforcement systems, for 18 lanes of the Georgia Route 400 extension in Atlanta. Amtech also coordinated all the civil work activity associated with this project. Unique to this contract is the provision of a license plate-mounted tag. The installation opened in August 1993.

The Georgia Department of Transportation estimates 69,000 vehicles cross the plaza daily with about 15,500 AVI transactions. Administrators have stated that the system is exceeding all expectations, with average daily transactions as high as 80,000. Four lanes are designated AVI-only express lanes. As of June 1994, a total of 35,000 tags have been ordered for this installation and about 28,000 tags have been distributed.

Harris County Toll Road Authority (HCTRA), Texas **USA**

The Harris County Toll Road Authority (HCTRA) operates the Sam Houston Tollway and the Hardy Toll Road. Cubic Toll Systems chose Amtech for design, installation and integration, and maintenance training services to provide ETC systems for 69 lanes, interfacing with Cubic's existing lane equipment.

The HCTRA system was retrofitted to 31 existing toll plazas. Five main barrier plazas were designed to provide tag-only lanes located on the left-hand side in each direction, that allow for non-stop AVI transactions at speeds up to 50 mph. Amtech also provides system monitoring services.

Average daily transactions total 290,000, with about 30,000 AVI transactions. As of June 1994, over 26,000 of the 40,000 tags ordered were distributed. This system also accepts tags issued by the Oklahoma Turnpike Authority and the Texas Department of Transportation.

Lake Pontchartrain Causeway, New Orleans, Louisiana **USA**

Amtech's ETC system operates on the world's longest double-span bridge (42 kilometers or 26 miles) over Louisiana's Lake Pontchartrain in New Orleans. Six lanes were commissioned in December 1990. Two lanes on the bridge are dedicated AVI only during peak-hour traffic. The AVI system interfaces with the existing plaza computer and vehicle classification system.

More than 27,500 crossings are registered daily, and 15,600 of these are AVI transactions. Tag usage approaches 90 percent of total rush hour transactions. As of June 1994, more than 15,600 tags have been issued. Regional multi-agency compatibility allows these same tags to be used on the Crescent City Connection in New Orleans.

Lincoln Tunnel, Port Authority of New York and New Jersey **USA**

Amtech assisted SAIC in equipping the Lincoln Tunnel with an ETC system to collect tolls from buses for the Port Authority of New York and New Jersey. This is the longest continuously operating ETC system in the U.S., performing reliably and accurately in a very rigorous environment since April 1988.

Two dedicated bus-only lanes of the tunnel's 12 lanes are equipped with the ETC system and handle about 2,000 daily transactions. Approximately 3,100 buses are tagged. This system has significantly increased toll collection reliability and revenues.

Lion Rock Tunnel (also see "Aberdeen" and "Cross Harbour") **Hong Kong**

The Lion Rock Tunnel in Hong Kong began ETC operations in September 1994. Although they are independent operations, the Aberdeen, Cross Harbour and Lion Rock Tunnels use the same AutoPass tag. Autopass Ltd., a joint venture with Cross Harbour Tunnel Co. Ltd. and Amtech, serves as a clearinghouse for customers to establish one account, with one tag, to use at the three tunnels.

ETC is installed at three of Lion Rock's 13 lanes. Total traffic at the Aberdeen, Cross Harbour and Lion Rock Tunnels is estimated at over 300,000 crossings per day, with approximately 80,000 AVI transactions occurring daily. As of September 1994, 42,000 AutoPass tags have been issued; 150,000 are expected to be distributed within the next few years. Expansion of tag use to other tunnels and car parks in Hong Kong is being considered.

New York State Thruway, New York **USA**

The New York State Thruway Authority integrated a complete ETC system using Amtech AVI systems at six locations: Spring Valley, Tappan Zee Bridge, Buffalo Grand Island (north and south plazas), Harriman, and Yonkers.

Spring Valley implemented ETC on eight of its 16 lanes, and the Tappan Zee Bridge on all of its 13 lanes in August 1993. In October 1993, Grand Island Bridge implemented ETC on all 12 of its lanes at two toll plazas. Each location has two AVI-only lanes that can expand to four as demand increases. Two other plazas representing eight lanes at Harriman and Yonkers were recently added, for a grand total of 41 lanes associated with this project.

These facilities average approximately 169,000 daily transactions; about 68,000 are AVI-based. As of September 1994, about 87,000 tags were distributed. Tags issued by the E-ZPass Center can be used at any of the locations.

Oklahoma Turnpike Authority, Oklahoma **USA**

As the world's largest currently installed ETC project, this system covers 209 lanes on 940 kilometers (585 miles) of all 10 Oklahoma turnpikes. Constituting the PikePass system, the first 88 lanes were commissioned in January 1991, followed by another 97 lanes in September 1991. The remaining 24 lanes were equipped in March 1992. This state-of-the-art ETC system allows a PikePass user to continue on the turnpike at highway speeds while an overhead tag reader automatically records and bills or debits the account. Those who are not PikePass users must exit to complete a cash toll transaction.

This geographically broad installation required Amtech to design a system that would interface with a massive telephone communications network and remote plaza computers. A total of 21 plaza computers were installed. In addition to providing reader systems, auxiliary equipment, software, and maintenance services, Amtech opened and now operates PikePass retail offices in Tulsa and Oklahoma City.

Amtech lane controllers were later integrated with all the turnpikes' AVI, manual collection and automatic coin machine systems. Amtech also provided PikePass' video enforcement system. As of June 1994, 240,000 tags were distributed. Of the 160,000 average daily transactions, approximately 70,000 are AVI transactions.

San Juan-Rio Piedras Bridge, Puerto Rico **Puerto Rico**

SICE, a systems integrator from Spain, purchased and installed Amtech ETC systems for Dycrex, the contractor for a new private toll bridge that links the beach community of Rio Piedras with the airport in San Juan, Puerto Rico. Equipment for six lanes were provided and 10,000 tags initially ordered.

Severn River Bridge, Bristol **England**

The Severn Bridge spans the boundary between England and Wales. Cofiroute, a French-based agency, awarded this installation to Elsydel who selected Amtech for ETC and video monitoring systems. The installation was completed in October 1992.

Three of the eight lanes of the Severn Bridge are equipped with Amtech hardware and software. This bridge serves approximately 35,000 vehicles per day in each direction, with about 4,000 AVI transactions. Amtech software was developed for three classes of vehicles: cars, vans and trucks. As of June 1994, 8,000 tags have been shipped.

Societe des Autoroutes Paris Rhin Rhome (SAPRR) **France**

In November 1991, Amtech's marketing partner, Elsydel, installed an ETC system in Villefranche, France, on its Paris to Lyon route for the Societe des Autoroutes Paris Rhin Rhone (SAPRR). The initial SAPRR system, called SVT (Systeme Voies Telepeages), included four mixed AVI lanes (with the potential of up to several hundred), and one high-speed "Presto" AVI dedicated lane.

An extension of the system to the Genay toll plaza (also north of Lyon) with four AVI mixed lanes officially opened in October 1992. Daily AVI transactions total approximately 9,000. About 5,500 tags have been delivered to Elsydel, with 2,500 distributed to users to date.

Texas Department of Transportation **USA**

In May 1993, the Texas Department of Transportation awarded a contract to Amtech for an AVI system to monitor traffic conditions on three Houston freeways (I-10, I-45, and US-290). The project includes design, hardware, installation, and maintenance services, utilizing a large communications network and spread-spectrum radio. Amtech also supplied data collection and monitoring services.

This is the first application of AVI for electronic traffic monitoring on a congested highway system. Amtech AVI tags installed on vehicles serve as intelligent "probes" that relay information regarding highway traffic flow and travel times to a traffic management facility operated by the Texas Transportation Institute (TTI). With the data from the Amtech tags, TTI is able to assess travel conditions and provide motorist information regarding travel times and alternate routing advisories via variable message displays on the roadway or through local radio broadcasts.

Phase I of this installation, already installed and operating, covers 36 sites (161 lanes). Phase II covers an additional 52 sites (315 lanes) across five more highways, including the Hardy Toll Road.

As of February 1994, about 4,200 tags have been ordered for distribution to commuters. The system is now used in conjunction with tags issued through the Harris County Toll Road Authority, as well as other compatible tags from public and private entities.