EEVC NEWSLETTER

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A NARROW ADVANTAGE?

A few years ago an outfit called Commuter Cars, Inc. in Spokane, WA announced that it was working on an unusual EV that would combine very small size with high performance and luxury. The car, called the Tango T600, was less than 8 1/2 feet long (so it fit sideways in a parking place) and only 39 inches wide and 60 inches tall.

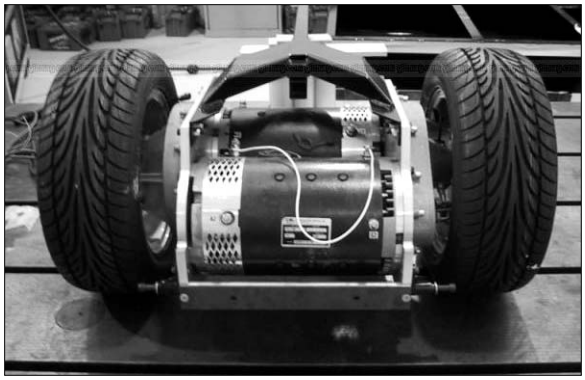
The ultra-narrow Tango T600 is only 39 inches wide, yet claims sports-car handling and a 150 mph top speed.

Students of automotive history will think immediately of something called the American cycle car, which was a class of cars that appeared at the turn of the 20th century. Intended to cost as little as possible, they were based on bicycle components, and were very narrow indeed — some so narrow that driver and passenger sat one in front of the other. They had tiny engines and were as minimal as you could get and still call the result a car.

Well, the Tango is very narrow, and it does have tandem seating for two, but it's not minimal. For one thing, it claims to have a 0-60 mph time of about 4 seconds, a quarter mile time of about 12 seconds and a top speed of 150 mph, and a range of 60 to 80 miles. It's also expensive: $85,000.

While a car as tall and narrow as this might be expected to fall over easily, the company says that by putting 2000 pounds of the car's 3000 pound weight under the floor they've given it the equivalent to a 5-star NHTSA rating, placing it in company with the lowest slung sports cars. They even say that, regulations permitting, it can drive between lanes like a motorcycle and zip through stalled traffic. *(Editor's note: motorcycles are allowed to do that in California, which can be a little startling when first seen — and maybe suicidal).*

Other claimed safety features include race car style roll cage design and 4-point harnesses.



This rear view shows what makes the Tango go: two Advanced DC FB1-4001 9-in. motors, one driving each rear wheel with over 1000 ft-lb of combined torque at low rpm and 8000 rpm redline.

I called Commuter Cars vice president Bryan Woodbury and asked him if there were any Tangos available for sale. He said that the first production unit was just about ready to go, but that it wouldn't be sold as an assembled car. Instead, it comes as a kit, to get around certain legal restrictions. Also to comply with regulations, some of the necessary parts are not included; the buyer has to obtain brakes, steering wheel and tail lights independently, although the instructions with the kit are specific as to what to use.

For your $85,000 you get a carbon fiber body, Connolly leather interior, Sparco seats, A/C and heater, MoTeC dash and a 400-Watt sound system. The car has two Advanced DC electric motors producing over 1000 ft-lbs of torque, a 2000 amp Zilla controller with 600 kW peak output, front suspension with unequal-length control arms with coil-over shocks, trailing arm rear suspension with coil-over shocks, four-wheel disc brakes, cruise control and front and rear trailer hitch receivers (so you can tow a generator trailer for long trips or tow the Tango behind your motor home). Power comes from 25 Exide Orbital XCD's or Optima Yellow Tops.

Woodbury said that he has several orders for the T600 already, and about 50 more for the lower-priced versions, the T200, which lists for $39,900, and the T100, at $18,700.

While the first hand-built production T600 is just now being completed, work won't start on the T200 and T100 until the company gets into mass production, and that will have to wait until they get $40 million to set up the facilities.

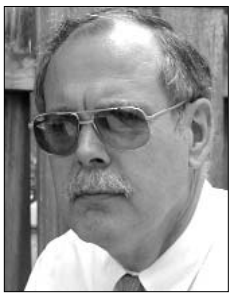
While the Tango looks like a lot of fun, there is a small EV available off the showroom floor today: The Corbin Sparrow, a three-wheel single-seater that looks even stranger than the Tango, goes 70 mph and has a range of 40 to 60 miles per charge. And it costs just $14,900.

NEW PRIUS FOR BEV AND ED

Ed Kreibick reports that his wife was so impressed with the Toyota Prius that she saw at the 25th anniversary dinner that she said she would like to have one. The Kreibick's 30th wedding anniversary was coming up in August this year and Ed says he is not much of a jewelry buyer, "so I figured why not stop and inquire about a Prius and see how long the wait is."

"I stopped at the local dealer in Doylestown — Thompson Toyota — and found they had a demo, but also just received a shipment the day before with three vehicles unclaimed. To make a long story short, I left a deposit on Monday, came back with a shocked wife Wednesday and drove it away. She is THRILLED with her new car and there is still spark after 30 years! The motto to this story is 'Nothing says I Love' You like a new Toyota Prius hybrid."

A LITTLE TRIP TO SILICON VALLEY
By California Pete



As part of our continuing exploration of California, my wife and I took a Sunday drive to Silicon Valley, and noted some things of interest.

A glance at the map will help show where everything is. On the east side of San Francisco Bay is, of course, the East Bay, where we live. South of us is the South Bay, home to Silicon Valley, which has San Jose on its eastern edge and curls up to the west onto the lower end of the Peninsula (at whose extreme northern end is San Francisco) to include Cupertino, Sunnyvale, and Palo Alto. We drove from home down the east side of the bay to San Jose, explored the town a bit, took Route 82 (which is the designation in this area for El Camino Real, the old Spanish

route that extends from Sonoma in the north to San Diego in the south) up the peninsula to and then back across the bay via the Dumbarton bridge and back home.

Downtown San Jose has parks, museums, a university, a convention center, lots of urban trees, and a great many houses with Victorian architecture. The latter are, of course, very expensive, but real estate in the entire area is terribly expensive. The median price in the Bay Area is now $622,000, and there are many houses going for much more.

Two things are immediately striking about Silicon Valley. One is that the major streets are very wide, some six lanes for what would ordinarily be a normal suburban road. This is because during the week the traffic is completely impossible, and even with six lanes things grind to a halt during rush hour.

The second thing is the large number of Indian restaurants. A great many Indian engineers, programmers and computer scientists come there for work, and many are recruited by the tech industry under the Labor Department's H-1B regulations, which allow those with so-called critical skills to enter the U.S. These people must be sponsored by an employer, who certifies that no qualified American can be found to take a particular job, and some people have accused employers of abuse of the system, specifically by advertising a job at such low wages that there are no local applicants.

I mentioned this to my son, who is a web programmer and heads up a small group of programmers at his company (which is some distance from Silicon Valley), and he told me that he hires Indians all the time. It's not because of the money, he said, it's that the only people who apply for the jobs and are actually qualified to do the work (and put in the long hours the job requires) are Indians. This is good for my son — he needs well-trained and motivated people — but it makes me wonder what happened to all the Americans. He tells me that either they're already working or they don't like to put in all those hours. He puts in those hours himself, and feels that his people should do the same. So perhaps we shouldn't feel too bad about out-of-work techies in Silicon Valley.

In any case, it makes things pretty good for fans of Indian cuisine.

INTEGRATING CAR AND HOUSE?

American Honda Motor Company and Massachusetts-based Climate Energy, LLC are working on a system that will combine home heat and power technology. The system uses micro combined heat and power (MCHP) cogeneration technology with natural gas to provide both residential heat and electric power.

Honda will supply its compact home-use cogeneration unit to Climate Energy who will combine it with a furnace or boiler, and market the entire system as an alternative to conventional space heating and electric power in new and existing homes. Working in coordination with state and local authorities as well as energy utilities, limited in-home field test installations will occur by late 2005, with more widespread distribution planned from fall 2006.

The system consists of a small natural gas-powered internal combustion engine and a small generator and can generate up to 3 kW of thermal output and one kilowatt of electricity. Honda claims that the system provides more than 85 percent efficiency in converting fuel energy into useful heat and electric power, and in some areas allows power to be sold back to the utility.

More than 15,000 homes in Japan already have a similar system.

TOYOTA ELECTRICS TO BE SPARED

Over the past several months a nationwide campaign has been under way to dissuade Toyota from crushing the remaining RAV-4 electrics, and as of July 16 the effort appears to have borne fruit.

DontCrush.com, the Campaign to Save Electric Cars, had led international protests against the crushing of electric cars by General Motors and Ford and persuaded Ford to sell, rather than destroy its US fleet of Th!nk City electric cars, which are now being sold to customers in Norway. It also convinced

Ford to sell rancher David Raboy and other leaseholders their all-electric RangerEV pick-up trucks.

On May 10 the group changed its focus to saving the Toyota RAV-4 Electric. Thousands of RAV-4 EVs were manufactured from 1997-2003 to comply with California's Zero Emission Mandate, but, like the EV-1, were leased rather than sold. Toyota had refused to sell them to drivers but was, instead, crushing them.

Apparently Toyota had allowed individual leaseholders to purchase their RAV-4 EVs, but not those under commercial lease.

The campaign attracted an increasing amount of publicity, and by the beginning of July had attracted the support of the Natural Resources Defense Council (NRDC), the Union of Concerned Scientists (UCS), the California Environmental Protection Agency, the American Lung Assn., the Sierra Club, Rainforest Action Network, Global Exchange, Bluewater Network, Earth Resource Foundation, and the nonprofit Electric Auto Assn, as well as several politicians.

Agreement reached

On July 16 Paul Scott, the head of DontCrush.com, announced that Toyota had agreed to stop crushing salable, useable RAV-4 EVs. Points of agreement with the DontCrush.com negotiating team included:

• No more usable cars will be crushed (the definition of "usable" is still to be worked out.)

• Current lessees shall have the option to continually renew their leases as long as the vehicle is usable, as defined by Toyota and the consumer.

• Toyota will re-examine their policy of not selling fleet RAVs and attempt to give current lessees the option to purchase their vehicles outright.

• Toyota will create a process by which RAV-4 EVs deemed not salable or usable will be dismantled for parts to be used by the remaining vehicles.

• Vehicles neither re-leased nor purchased will continue to be used; they will be sold to the public, used in the Toyota corporate fleet or made available for use by non-profit organizations.

Some details are still to be worked out.

LIKE A FISH?

DaimlerChrysler has announced a new concept car that it claims was inspired by a fish. The company says that the overall shape of their so-called bionic car was copied from the tropical yellow boxfish (*ostracion cubicus*) and boasts a drag coefficient (Cd) of 0.19, yet has plenty of interior room.

The car has two doors, four single seats, a panoramic windscreen, a glass roof and a large tailgate and measures 4.24 m (167 inches) long, 1.82 m (71.7 inches) wide and 1.59 m (62.6 inches) high. The car is powered by an internal combustion (diesel) engine, which gives it a top speed of 190 kph (118 mph) and mileage of 4.3 l/100 km (70 mpg).

Now if they would only make it electric...

ULTRA LOW ENERGY VEHICLE

On July 4 a team formed by industrial gases company the BOC Group unveiled a car fueled by a hydrogen fuel cell that was

intended to break to world mileage record of 5,385km/l (just over 15,000 mpg) by using just 25 watts of power. The car, called the Ech2o and made of carbon fiber and aluminum and having a top speed of 30 mph, was slated to compete in the Shell Eco Marathon at Rockingham Raceway the following week, and is shown with its 13 year old driver. We don't yet know how well it did at Rockingham, as BOC has had nothing further to say since that date.

A fuel cell racer

This isn't the only fuel cell car BOC has been working on. In June the company announced their intention to build a fuel cell sports car called the LIFECar. The 2 1/2-year project involves British sports car manufacturer the Morgan Motor Company, BOC, QinetiQ, Cranfield and Oxford Universities, and OSCar, with partial funding by the Department for Trade and Industry (DTI).

Nobody can say the car will look bad, as it's to be based on the Morgan Aero Eight. The 24 kW fuel cell will be from QinetiQ and there will be a motor on each wheel, with ultracapacitors for acceleration and regenerative braking.

SUPERMILEAGE CARS

On June 15 the Society of Automotive Engineers (SAE) announced that Mater Dei High School of Evansville, IN and the University of British Columbia had taken top honors at the organization's Supermileage competition at the Eaton Corporation Proving Grounds in Marshall, MI. The Mater Dei High School entry achieved 1836 mpg, while the University of British Columbia car (pictured) finished first in the collegiate division with 1608 mpg. This is the second consecutive wining year for both schools.

The competition involves building a one-person, fuel-efficient vehicle using a one-cylinder engine from Briggs & Stratton (which may be modified), then running six laps around a 2.6 km (1.6 mile) oval test track at a minimum average speed of 24 km/hr (15 mph). Each vehicle must travel a total distance of 15.5 km (9.6 miles) in a maximum of 38.4 minutes.

MITSUBISHI ANNOUNCES EV PLANS

On May 11 Mitsubishi Motors announced the technology it plans to use for upcoming EVs: lithium ion batteries and wheel motors, and that it was working on a test vehicle that utilizes these technologies, dubbed the Mitsubishi In-wheel motor Electric Vehicle (MIEV).

The in-wheel motor, says the company, makes it possible to regulate drive torque and braking force independently at each wheel without the need for any transmission, drive shaft or other complex mechanical components. Lithium-ion battery technology was

chosen for its specific energy, specific power, and life over other types of rechargeable batteries, and was expected to contribute to higher top speeds, extended cruising ranges and to greater weight reductions in hybrid and fuel cell vehicles.

The company started development and testing of the MIEV concept using a production compact vehicle, Colt, to serve as the rolling test bed. The Colt EV uses rear in-wheel motors powered by a lithium-ion battery system. The company is also developing a more powerful in-wheel motor for use in a 4WD test car.

Specifications on the Colt EV are as follows:

Base model: Colt Sport-X (1.5-liter, 4WD)

Length	3885 mm
Width	1680 mm
Height	1550 mm
Curb weight	1150 kg
Occupants	5
Max. speed	150 km/h
Cruising range/charge (10-15 driving pattern)	150 km
Motor (with internal reduction gear)	
Type	PM synchronous
Max. output	20 kW (15 hp)
Max. torque	600 Nm
Max. speed	1500 rpm
Dimensions	310 mm (dia.) x 220mm
No. fitted	2
Battery	
Type	Lithium-ion
Capacity	40 Ah
Voltage/module	14.8 V
L x W x H	194 mm x 175 mm
No. of modules	22
Controller	Inverter
Drive	Rear wheels
Tires	185/55R15

The company has announced plans to put EVs into production by 2010, according to news reports, but whether it will be able to do so is by no means certain, as it has sustained considerable losses following a scandal concerning cover-ups of serious vehicle defects, a scandal that included the 2004 arrest of former company president Katsuhiko Kawasoe.

ZAP DELIVERS FIRST U.S. SMART

ZAP (Santa Rosa, CA) has announced delivery of the first first U.S. compliant Smart Car to a buyer in Phoenix, AZ. Businessman and microcar enthusiast Roberto Hernandez was to receive the car in a ceremony on July 12. Hernandez was top bidder in a recent eBay auction for ZAP's newly available U.S.-compliant version of the European-made high-efficiency automobile.

DOE, USCAR INVEST $195 M TO DEVELOP ENERGY-EFFICIENT VEHICLES

On July 14 Secretary of Energy Samuel W. Bodman and leaders of the United States Council for Automotive Research (USCAR) announced an agreement that could reach $125 million over five years to develop advanced high-performance batteries for electric, hybrid electric and fuel cell vehicle applications. The agreement is set for three years with two one-year continuing options in which the government and industry will share the costs of research. The DOE's FreedomCAR Program and USCAR's U.S. Advanced Battery Consortium (USABC) will split R&D costs for a number of new battery materials and technologies.

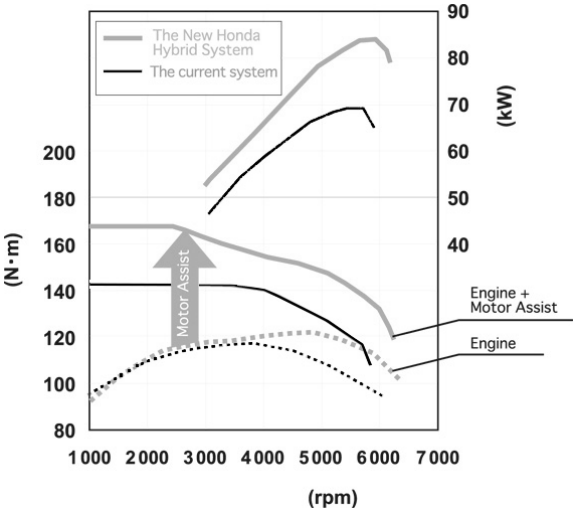
USABC is also pursuing the development of advanced lithium ion systems.

NEW HONDA HYBRID SYSTEM

Honda Motor Co., Ltd. announced on July 5, 2005 that it had developed a new hybrid system featuring the company's new 1.339-liter 3-stage i-VTEC (Variable Valve Timing and Lift Electronic Control) engine with three stages of valve timing (low-rpm, high-rpm, and cylinder idle mode), combined with Honda's IMA (Integrated Motor Assist) system, which has been made more compact and efficient. The new system will be introduced in the new Civic Hybrid, to be launched this fall. Honda claims an approximate 20% increase in system output over the current system while improving fuel economy by 5% and cutting emissions.

The 3-stage i-VTEC engine employs three hydraulic pathways to couple and uncouple five rocker arm assemblies, providing three

stages of valve control depending on the driving conditions. During deceleration combustion in all four cylinders is halted and the



cylinders sealed shut, reducing pumping losses caused by engine aspiration for a 10% improvement in recovery of braking energy compared to the current model. Friction has also been reduced by using things like aluminum die-cast pistons with low thermal expansion for less friction under high-temperature conditions, ion-plated piston rings, and plateau honing of the cylinder walls for a smoother surface.

The new electric motor uses coils with high-density windings and high-performance magnets to produce output 1.5 times that of the current model while maintaining the same size. Battery output has been increased by around 30% over the current model, while a more compact battery box provides better cooling and vibration resistance for improved long-term reliability.

The regenerative braking system hydraulically controls the brakes based on the amount of brake regeneration, permitting maximum braking regeneration with smooth deceleration that conforms to brake-pedal pressure.

The air conditioner compressor is powered by both the engine and the motor. When the engine is in Idle Stop mode the compressor is powered by the motor; if rapid cooling is required it is powered by the engine and motor combined. When the temperature is stable it runs off the motor alone.

REMEMBER THE JET?

Dave Goldstein showed his Jet Electrica ('81 Mercury Lynx) EV conversion at the July 19 EVA-DC meeting, and most people will agree that Jet Industries of Austin, TX did one of the better conversions of that period. This picture under the hood shows how neatly everything was put in.

Dave is a Jet factory-trained EV technician and has refurbished this 96 V, garage kept EV with a new set of US125 batteries, a new charger and a custom dual battery cable system for improved connectivity and performance. The factory A/C is still blowing cold air and the black leatherette and charcoal cloth interior still looks brand new.

The car will soon be available for sale to a buyer who will properly maintain it. The Washington club folks would prefer to see it remain in the DC area or at least in the mid Atlantic region, but an eBay ad is in the offing. Minimum bid price: $7500. Contact Dave at goldie.ev1@juno.com.

Thanks to EVA-DC for the above item.

MN TAKES EARLY LEAD IN NORTH AMERICAN SOLAR CHALLENGE

As of July 18 the University of Michigan solar car was the early leader of the North American Solar Challenge. The 2500-mile solar car race started on July 17th in Austin, Texas, and will end in Calgary, Alberta, on July 27th. Twenty teams entered the race, including five from Canada. In this second and longest leg of the race, teams drive as far as they can over a 10-hour period each day, aiming for Winnipeg, Manitoba, by Saturday. July 18th results are based on when the teams passed a checkpoint in Broken Arrow, OK.

As of July 23 the racers had reached Winnipeg. Leading teams were to rest and

recharge while the rest of the pack made their way to the border. The next stage starts July 24.

NEWS UPDATE

First in wind

The Boston Globe reported on June 14 that the nation most wedded to wind power is Denmark, which not only derives almost 20 percent of its electric power from its extensive off-shore wind farms, but has become so good at the design and construction of wind turbines that it has become the nation's biggest industry.

Hybrid cabs for New York

On July 1 a story by David Caruso of AP reported that the New York city council had passed a bill that would allow taxi owners for the first time to put hybrids into service, starting in late summer. The next step is up to the taxi commission, which had been blocking hybrids because the available models did not have the rear legroom and large trunks that it said New Yorkers were entitled to expect.

The taxi commission reported that it was close to selecting one or two hybrids models on a trial basis.

San Francisco has had 15 hybrid Ford Escapes in its taxi fleet since February.

Agreement on bird-killing windmills?

The controversy continues about the danger that windmills present to birds. Readers will remember that the February issue discussed the number of bird deaths attributed to the Altamont Pass wind farm — up to 4700 birds, including golden eagles, red-tailed hawks, American kestrels, burrowing owls and other raptors killed in collisions with the turbines every year.

On July 6 AP reported that a federal judge had allowed a suit by environmental groups to go forward, and on July 8 the *San Francisco Chronicle* reported that the Alameda County Board of Supervisors had voted to shut down half the 1500 windmills in the Altamont Pass each November and December to protect the birds; those would be turned back on while the other 750 would be closed down in January and February. The plan also calls on the wind-farm owners to permanently shut down about 100 of the most deadly turbines and to phase in safer ones over the next 13 years.

COMING EVENTS

2005 SAE Future Transportation Technology Conference
Sept 7-9, Chicago. Co-located with the 2005 IEEE Vehicular Power & Propulsion Conference. For information call 724-772-7131, or go to meetings@sae.org.

2005 Fuel Cell Seminar
Nov 14-18, Palm Springs, CA. For information call 202-973-8671, fuelcell@courtesyassoc.com, www.fuelcellseminar.com.

ITS America 12th World Congress on Intelligent Transportation Systems
Nov. 6-10, San Francisco, CA. Call 202-484-4847, www.itsa.org.

Electric Drive Transportation Association Conference & Exposition 2005
Dec 6-8, Vancouver, BC. Call Pam Turner, EDTA Conference Manager, 408-395-0059, pturner@firstoptionevents.com.

Clean Heavy Duty Vehicle 2006
Feb 22-24, San Diego, CA. Contact: Susan Romeo or Monica Alcaraz, 626-744-5600, Srromeo@weststart.org or Malcaraz@weststart.org, www.weststart.org.

Michelin Challenge Bibendum 2006
June 9-12, Paris. Contact at http://www.challengebibendum.com/challenge/front/affich.jsp?codeRubrique=45&lang=EN, or go to www.www.challengebibendum.com.

MEETING SCHEDULE

Meetings are held in Room 35, Plymouth-Whitemarsh High School, 201 East Germantown Pike in Plymouth Meeting, PA, and begin at 7:00 p.m. Note that the next meeting will be September 14, as meetings are suspended over the summer.

September 14

October 12

November 9

December 14