



# The Freeway Newsletter

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## The HPVs of 1990

The speed record for an unassisted racing bicyclist is just over 32 mph. The record for an HPV, a single-seat tricycle Vector is 56.6 mph. (HPV means human powered vehicle)

There are two reasons for the difference: The first is streamlining; the second is getting the rider at an angle that allows more power to be put into pedaling.

An HPV is a fiberglass-bodied whirling dervish of chains gears and legs cranking a set of bicycle pedals. You can buy the exotic Vector, designed for racing, from Versitron Research Corporation of Anaheim California.

Chester Kyle, past president and founder of the International HPV Association, thinks HPVs still have a long wait for their day. For one thing, an HPV, being only 32 inches high, isn't within the field of vision of the ordinary automobile driver.

Kyle thinks today's HPVs are the beginnings of hybrid vehicles of the future. Add a half or one-horsepower motor to an HPV and you have a commuter vehicle that could get as much as 200 to 400 miles per gallon.

## Connecticut Allows Freeway

Public Act No. 81-394 which was adopted by the '81 Session of the Connecticut General Assembly provides for the registration of "high-mileage vehicles" by the commissioner of motor vehicles. A "high-mileage vehicle" is defined by the act as a motor vehicle having the following characteristics:

- (1) not less than three wheels in contact with the ground;
- (2) a seat on which the driver sits which is completely enclosed;
- (3) a single or two cylinder, gasoline, diesel or electric powered engine and
- (4) efficient fuel consumption."

Under the provisions of Section 11 of Public Act No. 81-394 the commissioner of motor vehicles is called upon to adopt regulations "which (1) establish safety and performance standards and (2) require any safety equipment the commissioner deems necessary for any high-mileage vehicle."

## If You Mess With a Thing Long Enough, It'll Break ... and Other Laws

The following are some laws of the universe, the subtle yet immutable substructure which is the basis of cosmic order that apply to maintenance of your Freeway.

**LAW OF ANNOYANCE** -- When working on a project, if you put away a tool that you're certain you're finished with, you will need it instantly.

**THE SPARE PARTS PRINCIPLE** -- The accessibility, during recovery of small parts which fell from the work bench, varies directly with the size of the part and inversely with its importance to the completion of work underway.

**WATSON'S LAW** -- The reliability of machinery is inversely proportional to the number and significance of any persons watching it.

**HORNER'S FIVE-THUMB POSTULATE** -- Experience varies directly with equipment ruined.

## More Three Wheelers of the Past

1921, Moto-Car, Italy. Buyers had a choice of two 5.V. flat twin air cooled engines of 575 cc and 745 cc. The three-speed gearbox incorporated a reverse. It had tandem seating, the driver sitting in the front, except on taxi versions where occupied the rear seat. On a weight of 445 pounds, Armino Mezzo of Turin, its builder, claimed a top speed of about 40 mph. Only about 50 were sold; and the political-economy of the country at the time contributed to its demise.

1922, Cyclauto, France. Water-cooled, four vertical cylinders in-line-950 cc with 25 hp. It was a two-seater with shaft and level drive. In France the cyclecar had a longer vogue than in other countries, if only because it possessed a legal status. The regulations stipulated a capacity of not more than 1,100 cc, seats for no more than two, and a maximum weight of 350 kilograms. These standards could be met only by the lightest simplest three-wheeler, such as Sarant's version of the British Morgan. Many other cars were on the wrong side of the regulations and circumvented the law by selling their cars with two invoices, a "stripped" one for the tax man, and a second piece of paper listing all the forbidden extras. Understandably the government gave up the unequal struggle after 1925.

1923, Lila, Japan. Japan was slow to develop a motor industry. Her roads were narrow and tortuous, and government sponsored Automobile Control Laws laid down what could be made and what could not, overall dimensions being restricted as well as cylinder capacity, which explains why the first Datsun of 1931 had a narrow track of only 39 inches. Thus the best customer for any would-be manufacturer with aspirations outside the cyclecar class was the government, who wanted American-type vehicles, and bought them from the native industry as well as from Detroit's Japanese assembly plants (both Ford and Chevrolet were assembling there by 1925). Some makers copied European designs, as witness Ishikawajima's Waiselays, and the twenty Type-A Mitsubishis made in 1917-19, which were FIATs in all but name. By contrast, Junyo Toyokawa's Hakuyosha Ironworks of Tokyo managed to turn out some 270 Otomo light cars with air and water-cooled four-cylinder engines in the middle 1920's.

The real father of the Japanese automobile industry was, however, an American aircraft engineer named William R. Gorham who settled in Japan and became a Japanese citizen. Gorham's Jitsuyo Jidosha Seizo Company entered the automobile industry when he designed a three-wheeled invalid tricer for his works manager. This curious little vehicle had handlebar steering, and an air-cooled twin-cylinder engine drove the right rear wheel, but the Gorham's compact proportions proved admirably suited to the narrow Japanese roads, and a fair number of the cars were produced; they can be regarded as the direct ancestors of Japan's commercial three-wheelers, which were popular until the very late 1960s, among the leading manufacturers being Daihatsu and Mazda. A bigger shaft-driven four-wheeler followed, this evolving into the Lila of 1923, which was made for three seasons in passenger and commercial form. Its air-cooled 10 h.p. engine gave it a top speed of 30 mph. In 1926 J.J.S. merged with Kwaihinsha (Dat) and the combined group elected to concentrate on trucks until 1930, when a change of policy resulted in the 500 cc four-cylinder Datsun (Son of Dat) which later became the Datsun. By 1938, the resultant Nissan Motor Co. was said to be capable of turning out 18,000 passenger cars a year, though Japan's military expansionism probably diverted most of these to the Imperial armed forces."

Article from Passenger Cars 1913-23 by T.A. Nicholson  
Published by The Macmillan Company, New York. Page 153.

#### EV Hybrid

The Mother Earth News has a story about an EV hybrid that they say gets 83 mpg at 20-50 mph. They say you can build it for \$2000. My guess is that one must have the car first and then build in the changes. Anyone interested see Issue # 65.

#### Chains

One of the first things new Freeway owners learn about is chains. Roller chains are designed to meet ANSI (American National Standards Institute) standards for transmitting power on motor drive. Chains are measured by pitch and roller width and labeled with ANSI numbers. Ours is #50.

Whether you buy a new pre-cut chain or cut one yourself, you need to count the pins. Ours has about 84 pins and is about 5'5" long.

When the time comes, count them yourselves in case I miscounted.

I purchased a new chain at a motorcycle shop for \$23.95 plus tax. I later found roller chain in the 1981 Sears Farm catalog sold in 10 ft. sections with one loose connecting link for \$20.99 plus shipping and tax. If you add a chain breaker for \$11.99 it appears that for about eight dollars more you can get two chains at Sears. Solid rollers give maximum chain life.

I have changed brands of lubricant and am now using 10:1 motorcycle chain lube.

#### Pulsating Stop Lamps illegal

The NHTSA has decided that modulated brake lights are a violation of the Federal Motor Vehicle Safety Standards, Section 108 (a) (2) (A), which requires that stoplights burn steadily. It specifically states, "No manufacturer, distributor, dealer, or motor vehicle repair business shall knowingly render inoperative, in whole or in part, any device or element of design installed on or in a motor vehicle or item of motor vehicle equipment . . ." The NHTSA views any brake light modulation device as "rendering partially inoperative a motorcycle's original equipment stop lamps. This means that any manufacturer, distributor, dealer or repair business that installs such a device could be subjected to civil penalties; such civil penalties could be \$1000 for each violation.

#### O-switches Okay

In California, at least. The O-switch is a modulation device for motorcycle headlights which causes them to pulse and so be more noticeable to drivers. There seemed to be a lot going for them in increasing the visibility and thus safety of the motorcyclist, but the CHP told us they were illegal in California, a state with a giant motorcycle population. But that has changed. According to the latest handbook issued by the California Department of Motor Vehicles, "Motorcycles may use vibrating beam headlights by day." That should cover the O-switch.

#### USA Items

Luck you, you don't remember this device. But old BSA workers standing in line for their unemployment checks will. It's the infamous Ariel 3. Introduced in the fall of 1970 as a three-wheeled moped and the answer to a computer's prayer (they never found out which computer so they could sell him one), the company expected to sell about a thousand a week. In total, they may have sold a few hundred. The fiasco cost BSA millions of dollars.

#### The Starter

On August 21, my 450 wouldn't start. There was only a clicking sound when I turned the key in the ignition switch. Since I know the battery was good and I couldn't start it by connecting the two posts on the solenoid, I assumed that the starter solenoid was broken. I called the factory on the 26th and learned that the bolts holding the starter on the engines have vibrated loose resulting in the starter pinion gear not engaging the engine flywheel. The starter hadn't moved when I put my hand on it so I ordered a new solenoid. The solenoid (\$5.00) arrived September 2nd and I put it on after work. It

is a snap if you have a 5/16 wrench. Well it didn't start and I got the same click.

Luckily Joe Leuria from the local garage pulled up. He was returning my wife's Dodge van having just repaired the clutch after Alice broke down in the morning. (Joe is the one who took my driven clutch off the jackshaft.)

Joe said that sometimes the teeth of the starter don't mesh with the teeth of the engine flywheel and instead jam. To loosen the jam you have to turn the engine over. On a regular car with manual transmission you can do that by putting it in third gear and pushing the car backward.

The way to do it on the Freeway is as follows: The crank shaft sticks out of the engine about two (2) inches on the right side. Put a pipe wrench on it and push down until the shaft is free. He did that and the Freeway started up just fine.

Joe, who may have been the only person who knew that the correct name for a pipe wrench is a Stillson wrench, said that in the old days that shaft had a hand crank on it to start the engine in case the battery was dead. It had a pin in it so it would let go of the hand crank when the engine started. He said the Freeway should have one of those - take note B-M-Vehicles.

For me he suggests that I carry my #10 Stillson wrench in the car. The solenoid is only a switch turned on by a switch, a complication made necessary because of the high current the starter must handle. It is located on the firewall on the left side.

#### The Little Plane That Could

The Cri-Cri, the world's smallest twin engine aircraft, made an impressive debut at the Experimental Aircraft Association Fly-In that was held in Oshkosh, Wisconsin, in August.

Designed in France, the 160 pound aluminum plane is 12 feet long and has a wing span of 16 feet. It cruises the skies at 110 miles per hour on the two 12 horsepower engines. The plane can be built in a garage from a kit costing \$6,000.00 and its wings pulled off when its time to pack it in a trailer. (Also called the French Cricket)

Without the wings, and rear stabilizers, the plane looks a great deal like the Freeway.

#### Information on B-M-Vehicles People

Dave Edmonson, President -- Graduate Mechanical Engineer from University of Minnesota. Three years with Donaldson Co., Inc., R & D. Seven years with 3M Co., Design Engineer on new copying machines. Four years with Toro Co. Project manager on outdoor power equipment.

Lee Landstainer -- Three years business school, started with the company on day one, presently head of purchasing and takes service calls.

Gary Terauskis -- Heads up design department. Trade school graduate in machine design.

Gary Vrelezelaar -- Shop Foreman. Extensive machine shop and assembly experience.

Dave says all of their personnel are hard workers and dedicated. He didn't mention Sue by name, but I think her pleasant voice and cooperative spirit do a lot for B-M-V's image when we call on the telephone.

#### More Three Wheelers of the Past



MESSERSCHMITT

Photo courtesy of Ed Beck. Taken in Germany in 1954.



MESSERSCHMITT



MESSERSCHMITT

Look into back window shows handle bar steering.

#### Crazy Ideas from the Editor's Desk

Radio Shack's TRS-80 Videotex Terminal works with your telephone and TV set to give you instant access to national information networks. The terminal features an internal memory that stores information for later viewing and cuts 'on line' time to a minimum. If you already have an Apple, an ATARI or TRS-80 personal computer or some other terminal, the software costs \$29.95, otherwise the terminal costs \$399. You also need a telephone interface for \$199.

If you already belong to an electronic news service let me know and I'll try to work something out. Big ideas for an infant kitchen table newsletter! But hold on, how about this?

A long trip in a freeway is probably a rare occurrence, but if you can go 900 miles on a tank of gas you will try it sooner or later. If your car broke down after 5:00 pm 450 miles from home, depending on the nature of the problem, it will be even rarer if you can find someone that has a part or would attempt to fix it for you. If there is a dealer network in the future it may have to be a 24 hour operation in the beginning. I only know of two ladies that own the Freeway. My guess is that women in general are not too keen on a fix it yourself type of car.

What about a variation of the European bed and breakfast program. A Freeway owner signs up for a year at a time. His name, address, and phone number are printed on a list. He or she provides certain things at a set price, eg: towing, you only need a rope, bed and breakfast, a minimum number of spare parts (belt, chain, tire, etc.), repair, or whatever he puts on the list; or maybe he has a videotex with access to repair information not in the owners manual, or an incoming WATS line to the factory.

Perhaps there never will be dealerships as we know them today. Afterall, Freeway owners are special people, willing to be different if its a better way to go.

#### Japanese K Class Cars

I suspected that there would be some three wheel high mileage one or two seat cars being made in Japan. I contacted the Japanese Automotive office in New York at the World Trade Center and was referred to the Japan Mini Vehicles Association in Tokyo who had the Automotive Herald send a copy of Japan Automotive News, one of their publications, which featured a story about Japan's mini-sized vehicles. I don't have the answer to my question yet but have some interesting information.

The sound K can be written in Japanese with the character meaning "light", and in Japan the K class is used as the generic name for the 550 cc maximum capacity motor vehicles. The origin of the word K vehicle dates back to 1949 when the Ministry of Transportation set the mini vehicle standard with the major specifications of 1,800 mm in length; 1,000 mm in width; 2,000 in height; and piston displacement of 150 cc for the 4-cylinder engine.

Since it was instantly clear that these specifications were not qualified to build 4-wheeled vehicles in a practical sense, the standard was revised in 1950, with length increased to 3,000 mm and width to 1,300 mm. In 1954, the maximum capacity was increased up to 360 cc. In 1970, 30 of every 100 new cars sold were K vehicles, ever changing buyers' attitudes, however, didn't allow the K class to get a larger piece of the market pie. Sales of K vehicles had a nosedive for 5 consecutive years after 1971. A higher standard of living and the loss of some major privileges exclusively given to the K vehicle owners were major reasons.

The government set the new mini vehicle standard for the third time in 1976. The new (and the current) standard gave the K vehicle the maximum dimensions of 3,200 mm long and 1,400 mm wide, and the maximum capacity of 550 cc. (This class is now similar to the European-built mini cars such as the Mini, Renault 4TL, Citroen 2CV or LN, and Fiat 126 or 127)

Builders of Japanese mini cars by company and model are: Suzuki Cervo Fronte, the Daihatsu Cuore, the Fuji H.I. Rex, and the Mitsubishi Minica Ami. None of these cars are exported to the United States or Canada. A record of mini passenger cars exported by destination (Jan.-June '80) shows 9,380 exported of which 5,807 went to South America, 1,515 to Asia, 1,431 to Europe, 367 to Central America, 111 to Africa, 76 to Oceania, and 73 to the Middle East.

Japanese passenger cars are classified as medium, small, or mini. During the period used above 147,042 medium and 784,943 small cars were exported to the United States.

#### Rolling Resistance Tires

The less resistance a tire meets the less power it needs to be propelled. These tires are made of a harder material, are for all weather use and are inflated to a higher pressure.

The Goodyear Arrivo Radial was recently introduced to me by Broadway Tire Sales Co. of Providence, RI. I was particularly impressed with its hydroplaning resistance tread design (P155/B0R12 at approximately \$40.00). It also eliminates the possibility of so-called "California wender" on grooved concrete.

#### News from Burnsville

The blower system kit for older Freeways should be available soon at a cost of \$22.00 (This information is current as of 9/81) detailed instructions included.

A recoil starter or rope pulley can be put on the engine and it can be obtained from a Tecumseh dealer. The starter is included in the warranty by Tecumseh.

LETTERS

Dear Dave:

8/10/81

(Editor's note: the following are portions of Bill's letter to Dave Edmondson - the full letter was 2 1/2 pages. I tried to pick out the best parts. Bill told me he purchased his Freeway insurance for \$150.00/year from USAA (United Services Auto Association). USAA building, San Antonio, Texas 78288. He is in the investment and insurance business.)

"Five weeks after taking delivery of my yellow Freeway 450, I have over 3,600 miles on the odometer, of which 2,600 has been on our U.S. freeway system. After driving it from Burnsville to Phoenix, I recently drove to Los Angeles and back in two days, and over the desert during the heat of the day. Why so many miles on the highways? Well, if I am going to try to interest people in purchasing this vehicle, I must know its capabilities and also weaknesses.

I purchased the Freeway sight unseen. It has been a very satisfactory vehicle, and never has missed a beat in the 3,600 hard miles that I have driven. My best mileage has been 57 mpg, and the lowest was 47 mpg around town. Does that compare favorably with other owners? I drive 45 to 55 on the highway, depending on the roughness of the surface.

A problem developed on the way to Phoenix concerning the rear wheel. When I drove over a depression, I found that the wheel rubbed on the back of the fiberglass body, where the license plate is installed. It becomes much more pronounced with a load in the back, and I can smell rubber burning, so imagine it is hard on the tire over the long run. Any comments on that?

I'd like to comment on the tendency to wander, especially on blacktop, where millions of cars have depressed the area where the normal tires trail and therefore have caused a slight raise in between the tire tracks. It may not be visible, but it's there and that little tire finds it and sways back and forth as it cannot ride that ridge perfectly. I find that if I move a bit to the left or right, and put the rear wheel in either the left or right depression, it does much better. One of the front wheels are now on the ridge, between the normal tire tracks, but they do much better than the rear. Is that good or poor observation, David? Concrete roadways do not have the indentations caused by auto tires and the ridge between them but they are older than blacktop and therefore rougher. The spaces between the blocks of concrete, put there for expansion I guess, and sealed with tar, are murder for the Freeway, and almost jarred my teeth out. I also noticed that the backlash from semi-trucks (and the wind was always wrong for me), was a strong impact like a sonic boom, but it did not cause the vehicle to sway as was true with my VW bugs some years ago.

The vehicle seems difficult to fill with gas without spilling, which may mean the venting system is not adequate? Anyway, by filling very slowly, one seems to avoid much of that. Someone in the quarterly publication from B.I. said that they had installed an "adjustable main jet" in their 450 carburetor. Any data on that?

One other comment about the Freeway and driving in the summer in Arizona. It cannot go too far without using the oil cooler, and then in addition to 110 degrees or so outside, the heater is on too. Any solution to that quite serious condition for those of us who live in the Southwest? I put a blanket on the left side to prevent a blast of heat but it still parboils my left haunch medium rare on any kind of an extended trip.

A thunderstorm in Kansas left me with a soaked carpet up front, so my wife put that filler substance all around the windows when I got to Phoenix. I washed it the other day, and noticed that the right front side window still leaks underneath and in front, and water is somehow coming in on the right hand upper side of the front compartment, wetting the area near the accelerator. Could be the radio aerial installation - I'm going to try to find it soon.

Just the other day we noticed some stress cracks on the fiberglass panels - one obvious one is in the rear near where the rear tire rubs on it, but one has now appeared on top of the left front fender, a seemingly unlikely place. Any comments?

It's fun to drive, impresses my clients who invest money with me, and saves me a bunch on my weekly gas bills. Thanks!"

Sincerely,  
Bill Kummer  
Phoenix, Arizona

Dear Sir:

8/31/81

"I flew to Burnsville July 28th and picked up my HMV, drove it back down to Texas. I live about 65 miles S.E. of Dallas and drive to work in Dallas 5 days a week. I have 4,000 miles on it now. I drive about 700 miles a week and so far I have had no trouble. I changed to Mobil 1 at 2400 miles and will keep on using it. Let me tell you I was scared spitless when I got in that thing and started south on I-35. It took me 4 or 5 hundred miles to get used to it and relax a little. It is one vehicle you don't relax in very much, it turns like a jack-rabbit being chased by a coyote.

I have experienced the same thing as all other HMV owners, the feeling that you are driving in a fishbowl in the nude.

I drive between 55 and 60 on good smooth roads and of course slower on rougher roads. Mine is bright yellow and I call it my "Texas Sunflower". I am getting exactly 56 mpg from the time I left Burnsville. The mileage seems to be going up slowly all the time (450 engine).

Well that's my story. Looking forward to the newsletter.

O.D. Nichols  
Nabank, Texas

Dear Don:

9/2/81

"1.) History: I met the fellow who owned two Messerschmitts. He drove my Freeway and thought it was much harsher than the Meas. Said that the brakes were funny (they are) and that his Messerschmitts were much smoother and quieter all around and repeated that he got over 100 mpg with both. They had two stroke engines, very small wheels and aircraftlike canopies. I testdrove one myself in the fifties when they were on sale here in Boston. Oh, and for what it is worth: when I attended an engineering conference in Austria this February, I was told by a German colleague that the Messerschmitt was prohibited in Germany due to too many accidents. It turned over easily due to the small wheels (8").

2.) More Freeway experiences: the outer sheath of the accelerator cable shifted, giving me a lot of loose cable lying in the driving compartment and making full throttle impossible. It took some time until I found this out. There is a clamp hidden in the carpet on the right hand side of the seat, one has to take it out, push cable back and reinstall. Dave Edmondson told me that the new 'production' version has two such clamps to avoid this, he sent me two spares, but I found nowhere to attach them.

Second problem was a failure of the headlight, oil pump, wiper and intermittently, that starter. This was caused by the nut that clamps the earth connection to the back of the wiper being loose. All the nuts on all the instruments were loose. An 11/32 splitite will work fine once you find a way to wrangle it into position. (I took the seat out first and placed newspapers and an old carpet between the angle irons for the seat so that I could lie on my back.

I clocked fewer miles since my last report, put tires back up to pressure in the back because I got used to the handling. Today is the first day for two months that I drove with windows in and no top.

I also talked to the Ft Walton Beach Yamaha dealer who makes convertibles. He will sell a blower that fits under the heater for \$16.00. He makes convertibles with two headlights.

He will sell the top alone for \$500.00 and says that it will fit our lower parts - of the Freeway of course! A friend of mine was down there and said that the convertibles look very nice with zippered on windows.

I ordered the kit that Edmondson sells for \$30.00 to make the car conversion. I expect that this will be necessary in Mass.

Oh! ALSO DISCOVERED THAT IT IS possible to turn the inner sheave of the driven clutch back to allow removing wear plugs, but have not done it since I installed the new clutch. I feel that the clutch wear is a function of the amount of stop and go driving one does.

Well, I hope that is enough to keep you and your readers informed. Thanks again for the service you render. How about a mid November Freeway picknick (cannot find time sooner). Good luck on all three wheels!!!

Tom Fornan  
Dover, Massachusetts

Dear Donald; 9/19/81

Please excuse me for not writing, but as I was turning my vehicle in the back yard I had an accident. I was using a caxter under the back wheel with a rope assisting. The rope broke resulting in a broken hip and knee; so 10 weeks later I write you.

I had just installed the headlights. They are #505 Duralay lens #419 removed and 71455 Hella installed. I mounted them very short to the fenders. Recently, my 13 year old son and I (on crutches) removed the top. I installed a large splash shield.

I have contracted to do only one show this fall. It is the New England Energy Expo. They gave a booth #10. I am enclosing a few passes.



Commonwealth Pier, Boston Mass.

A friend of mine has an order and received a letter from Dave that says something about improved steering. I wonder if we can improve ours? I wish we could all get together, maybe south of Boston someplace. Yours,

Curtis W. Hummwell  
Belmont, Massachusetts

Dear Don: 9/15/81

I'm happy as a clam with my Freeway #744 and an even resigned to a periodic clutch job. I hope the clutch servicing technique is perfected and described in the Newsletter before mine goes out.

A young woman neighbor thought the Freeway belonged to my 21 year old son. I said, 'Oh no - not enough horse power for him. Besides the back seat wouldn't be big enough.' She peered in and commented 'Well where there's a will there's a way!' Another lady's comment on that one - 'Well you'd have to be pretty determined!'

We're having a naming contest. Entries so far - 'The Great Pumpkin', 'Way-to-Go', 'Diddlebug!', and 'The Red Baron'. Sincerely  
David Spier  
Stuyvesant Falls, New York

p. 5

Dear Don: 9/13/81

Received our Freeway #899 at Burnsville on the 14th of July and immediately drove to Riverside, California, outside of Los Angeles, 1955 miles. The Freeway performed admirably considering the driving it went through. We left there on Monday and arrived here on Saturday of which we spent a full day in Salt Lake City. Had I been a salesman for H-H-Vehicles, I could have sold a bunch on that trip. Since I have been home, the jack shaft broke and also the driven clutch. Dave replaced them however. I turned a new jack shaft out of a harder steel. I now have 2800 miles on my Freeway and love it. I noticed from the Newsletter that people were having problems removing the jack shaft assembly. This is how I recommend doing it.

- A. Jack Vehicle, remove fiberglass bottom fairing. Block up vehicle.
- B. Remove chain and disconnect emergency brake at rear wheel.
- C. Remove rear axle bolts and allow rear wheel to come clear of rear suspension.
- D. Remove rear suspension bolts near pillar blocks, swing suspension to the right of the vehicle and the jack shaft assembly can be removed once the bolts are taken from the pillar blocks.
- E. To reinstall it is just the reverse.

So far the vehicle is easy to maintain. My wife and I enjoy ours, in fact the Freeway is the car both of us wish to drive most often.

Karl and Jan Edwards  
Perris CA

Donald: 9/22/81

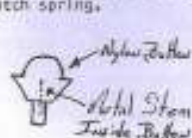
I took delivery of a yellow #50 cc model on September 4. It was ordered May 1980-order #876. It hasn't been long enough to contribute information other than my insurance company 'A.N.I.C.A.' won't touch it. I as a commercial photographer-primary clients include catalog, advertising, and fashion accounts. No weddings or portraits.

I am looking forward to getting acquainted with other 'Freeway' owners through the newsletter. Thanks.

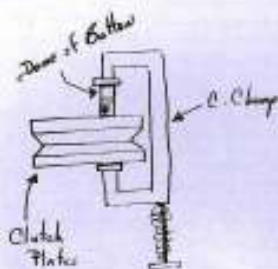
Doug Smith  
St. Louis, Missouri

2700 miles on my Freeway: 9/22/81

Today, I replaced my first set of driven clutch buttons. What a job! It took me 2 and 1/2 hours. First you must remove the clutch. In order to do this, you drop the lower engine cover. Take off the muffler. Unbolt the two Jackshafts which will lower the axle. Take the bolt off of the clutch, remove chain and slide clutch off of the axle. The nylon buttons are shaped like the picture below. If when removing the old buttons from the clutch you break the stem off like I did on two of mine, don't panic! Inside the plastic stem is a small metal pin. Squirt some WD-40 on the stem. The metal pin will pull out, but will probably leave the plastic stem in its hole. Just take a small screwdriver and stick it in the hole left by the metal stem and start prying the plastic out. Be careful not to scratch the outer metal of the hole. The plastic stem should break out in small pieces, mine did. Now to install the new buttons. Mine would only press in so far by hand and even trying a large screwdriver and pressing down didn't help much. I still had it about 1/16 out of its hole. So what I did was to take a large C-Clamp, one that will reach all the way into the top of the dome of the button. Mine was a 4 inch C-Clamp. You have to twist the clutch plate so you have room over the dome of the button for your clamp. It's a job since you'll be fighting the clutch spring.



\*Twist clutch plates so you get enough room for your C-Clamp to fit over dome of button.



I would twist the clutch plates for the room I needed, then put that between my legs so my hands were free to use the C-Clamp. Then slowly tighten the C-Clamp and you will get a great press fit for your buttons. I did put a dab of "lock-tite" on each button to help hold them in, but I think the press fit is good enough. Then just reassemble everything. Good luck guys!

Roy Baese  
St. Louis, Missouri

Dear Mr. Martin: 9/21/81  
I am happy to be making my one thousand mile report. Since receiving my 340 (order #921) in August I have thoroughly enjoyed driving it, and answering numerous questions about it. I do have two complaints (eds, note - "leaks" and "front two engine bolts difficult to get on).

I hooked up a three speed fan under the dash on the left side of the car. It helps...but doesn't do the trick.

The Newsletter is great. However, after reading the fall letter I am a bit concerned as to how long my clutch will last.

Michael B. Tussey  
Perkiomenville, Pennsylvania

#### Coefficient of Drag

CD is based roughly on the ratio of the amount of wind resistance an object encounters CD that encountered by a flat plate of the same size; the lower the number, the greater the efficiency. The average CD for an American car today is 0.45. The U.S. car with the lowest CD, 0.34, is Ford's new Mercury LN7. Specially designed land-speed record cars have CDs as low as 0.15.

Discover news magazine (October 1981) says that a bird has a CD of 0.30 and an airplane airfoil is 0.05. Car designers say that an open underside can account for as much as 20% of drag, but Detroit has yet to work out a cost-effective way of preventing a consequent heat buildup from the engine exhaust system. The ideal rear of a car should have a long, tapering tail that would allow the air to glide off it without separating. Finally, production and manufacturing technology will have to change radically. So, too will people's sense of what a car should look like. Says Fred Heylor, technical representative for Porsche: "We may never get away from thinking a car has to have four wheels, but we might get a more aerodynamic shape with only three. Some of those way-out experimental cars with low drag look quite amusing to us now." Considering the stiff prices at the gasoline pumps, those way-out cars are looking better and better.

#### Advertising

For Sale-Used Freeway in Mass., 6,000 miles, AM/FM radio, fan, and Mass. conversion kit. Good shape-Call (617) 785-1349

Comet Emblem, Decal - 2 1/4"	.10
Comet Embroidered patch - 4 1/2"	2.00
Driven Unit Button Inserts (3)	4.50
Activator Puck for Clutch, ea.	2.00
GP-730A Clutch & Torque Converter dry lub 12 3/4 oz.	6.95
Never Seize/prevents clutch freeze on crankshaft PTO 1 oz. tube	3.00
Champion RA-85 Spark Plug	2.50
18" 5/16 o/d hose	1.50
hose clamp	.70
1/8" aluminum shims (set of two)	2.50
SCL Plastic Cleaner & Polish 8 oz.	3.00

The above are for sale by Freeway News. (add .18¢ for postage to orders under \$2.00) S.D. residents add sales tax.

Windshield Scraper (red, yellow, or orange only)  
For sale by Freeway News .50

Donald J. Martin, Editor October 19, 1981

I have HHV Serial W 1970, and have been attempting to carry out the activities of the SAP/Plan. Jack Blum came to Cleveland, to see mine, and after I showed him what I had, he ordered. You made a mention in the last newsletter about his driving his new HHV home from Minnesota. He drove up to Cleveland a couple of weeks ago and had 3800 miles on it. I mention this because I have yet to hear from HHV about my activities in promoting the HHV.

Comments about Comet 940 Clutch: Good clutch, not high performance, but one of the best all around units. However, they are notorious for "losing their buttons." Comet has a spray lube for the clutch, but it smells and acts like WD40. Clutch should be lubed often! Use the "tube extension" that comes with WD40, and spray everything inside the drive clutch. Don't get any lube on the belt, or it will slip, and then "burn" when driven. Because of the design of the clutch, centrifrifical force will force any lubricant out the side away from the engine and it shouldn't get on the belt. Lube the clutch when HOT, then let it sit until cool. This will insure the "capillary action" of drawing the lubricant into all parts of the clutch. Also by letting it sit, any excess will run out harmlessly.

I will send along more comments as time goes by.

Note: I was an Arctic Cat and Polaris snowmobile dealer, and serviced all makes of snowmobiles, (and clutches) and Motorcycles (including Tokon which used torque-converters) since 1969. My comments are based purely on my personal experience with my machines and with customers service problems.

Roger P. Mathews  
Kirtland, Ohio

#### Editor's 5000 mile report

The new address of the Freeway News is P.O. Box 64, Yankton, S.D. 57078 starting Dec. 1, 1981. I drove my Freeway from Rhode Island to my new job in Yankton (1562 miles). Yankton is located in the southeastern corner of the State on the Missouri River. For the 1500 miles to Sioux City I averaged 67mpg. Total gas cost was \$22.50 (and one qt. of oil). Travel was all on Interstate highways as far as Rockford, Ill. The worst road conditions were around Chicago, and the worst weather was in Ohio where I was held up in a Holiday Inn for two nights because of a rain storm (I thought it would be better safe than sorry).

I stopped in DuBoise, Pa. (on I-80) and lost power to the drive wheel. The jack-shaft had broken. It was Sunday afternoon (Oct. 25), I had limited cash, and I had to start work the following week in Yankton. It was an unpleasant situation to say the most.

can't p.8.

11-18-81

### The Flora

We have all heard the comment that the Freeway looks like a small airplane without wings. A three-wheeler that looks even more like an airplane was designed and built by Chuck Ophorst. With 500 lb dry weight, the 175 cc Honda Twin goes 85 mph and gets 80 mpg (additional details... write Chuck Ophorst, Flora, Box 181, Fremont, CA 90723). It seats two people in tandem. Plans and body sets are available.

This information is from Design News (Sept. 7, 1981, pg. 192). It is published twice monthly at \$30.00 per year by Design News, 270 St. Paul St., Denver, Co. 80206. It is free for design engineers-qualification and company letterhead required. This magazine looks like a rust for anyone designing cars.

October 15, 1981

1. Here is a forced-air heater you can install for a few dollars and an hour's labor, which is safe and effective. You need a PVC Plastic Plumbing Fixture as shown, about 2" diam., a metal gas heater exhaust 90° flexible elbow, about 2 1/2", a 2 1/2" diam. cable clamp, and a hole in fiberglass to accommodate the PVC fixture.

2. There are many possible variations on the hardware-my selection was simply based on a single trip to the local hardware store. Just keep the duct from touching engine, exhaust or clutch assembly, and keep intake spaced 1 or 2 inches from engine head fins for forced air back pressure will not be seriously affected when outlet is capped in cab to turn off the heat. The system is somewhat noisy, but you will have a stethoscope to monitor any changes in engine performance by using appropriate flexible tubing, you can extend the system to the front windshield to provide defrosting capability.

Mention was made of hair-dryer motors for defrosting. I bought a hair dryer for about \$10, at a large discount store. It has a small, powerful 12 v.d.c. motor and turbine blade fan- an excellent candidate for use in the Freeway.

Steering is definitely too sharp for good highway speed. A H.M. vehicle mechanic told me that Ross MFG. Co. does not make a gearbox of comparable size or price with higher gear ratio. A partial solution is to replace the steering wheel with a 15 or 16 inch diam. size to increase leverage, and therefore effective steering ratio. I bought a 15" for \$20, at Warszewsky Auto in Chicago; I've seen similar wheels in auto parts shops and large discount stores. The job takes 15 to 20 minutes (4 bolts).

Another approach which I haven't yet tried is to drill a hole on the steering arm link about 1/3 of the way down toward the gearbox end, the same diameter as the existing tie-rod bolt hole. Placing the tie rod assembly in the inner hole will increase the steering wheel travel for a given amount of wheel movement, but at the 1/3 down hole location total wheel range may begin to decrease, thus increasing your turning radius. Trial and error! Also, a W transporter hydraulic steering damper will take some shinny out of the steering, under rough road and braking conditions. You can connect it between the tie rod and frame or steering arm link and frame. You'll have to braze or weld a bracket or maybe fabricate a bolt-on arrangement somehow.

Placing aluminum foil in the rear lights will make them reflect much more brightly.

Change the push-button off-on lamp leads from common hot to switch-side on individual device (lites, wiper, pump) switch. This way you will have lit lamps on each push button only when each is "on".

These modifications should keep you busy until the next issue of Freeway Newsletter.

Jim Linber  
913 S. Carpenter  
Chicago, IL 60607  
(312) 421-8244

### Diagram of the Forced-Air Heater

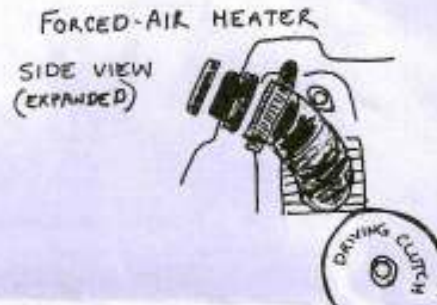
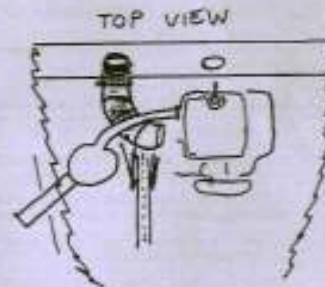


FIG A



### CALIFORNIA CUSTOM

The next issue will have a letter from Avi Branner of South San Francisco, CA., describing how he fixed up his Freeway. I wish the Newsletter was in color so you could fully appreciate his paint job. We will also have more letters from Bill Kummer, Bob Ferris, and Roger Newberry. Stay in the show til March.

### Freeway Newsletter Mailed to 27 States

As I promised here's the breakdown of the mailing list by states as of Nov. 1981. The total is 62 (not including the factory) which go to 27 states. Using factory delivery figures only about 13% of Freeway owners get a newsletter. States having 1 or less are left out to save space.

California	9
Pennsylvania	8
Massachusetts	3
Texas	5
Ohio	4
Illinois	3



# OWNER'S MANUAL

and Operating Instructions for

## TECUMSEH

MODELS **OH120 OH180**  
**OH140 HH100**  
**OH160 HH120**

HORIZONTAL CRANKSHAFT  
 CAST IRON • AIR COOLED  
 FOUR-CYCLE ENGINE



THIS SYMBOL POINTS OUT IMPORTANT SAFETY INSTRUCTIONS WHICH IF NOT FOLLOWED COULD ENDANGER THE PERSONAL SAFETY AND/OR PROPERTY OF YOURSELF AND OTHERS. READ AND FOLLOW ALL INSTRUCTIONS IN THIS MANUAL AND ANY PROVIDED WITH THE EQUIPMENT ON WHICH THIS ENGINE IS USED BEFORE ATTEMPTING TO OPERATE YOUR TECUMSEH ENGINE.



THE FOLLOWING SYMBOLS MAY APPEAR ON YOUR ENGINE:



FAST



SLOW



STOP



FULL



OFF

CHOKE

LITHO IN U.S.A.

8-1-80

181-226-1

### OIL & FUEL RECOMMENDATIONS

To start and operate your Tecumseh engine, you will need the following:

- 1 A CLEAN, HIGH QUALITY DETERGENT OIL. Be sure original container is marked with engine service classification "SC," "SD," or "SE."

FOR SUMMER (ABOVE 32°F). USE SAE 30 OIL. (SAE10W30 is an acceptable substitute).

FOR WINTER (BELOW 32°F). USE SAE 5W30 or 8W30 OIL. (SAE10W is an acceptable substitute).

(BELOW 0°F ONLY). SAE10W oil diluted with 10% kerosene is acceptable.

NOTE: For severe, prolonged, winter operation of HH120 model, it is recommended that SAE10W oil be used.

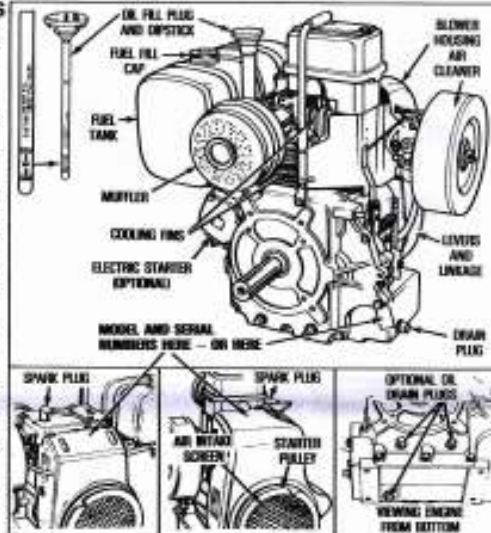
Oil Sump capacity is approximately 52 ounces (3 1/4 pints).

- 2 A FRESH, CLEAN, UNLEADED AUTOMOTIVE GASOLINE. (Labeled "Regular" grade gasoline is an acceptable substitute).

NOTE: Gasohol requires special care when engine is unused for extended periods. See "STORAGE" instructions on Page 5.

NOTE: Use clean oil and fuel and store in approved, clean covered containers. Use clean fill funnels.

(continued on Page 2)



Page 1

Figure 1

### Editor's Report

Without giving the kind folks that helped me their due credit here to make the story short, Emery Harriger made a new shaft for me (of better material) in his machine shop in Reynoldsville, Pa.

After that the chain stretched and came off west of Freeport, Ill. on a dark country road (US#20). I put another pair of shims on in a lighted parking lot down the road and it was OK until Waterloo, Iowa, after which it jumped off the sprocket several more times. The last night on the road with the loose chain was made easier by the fact that I had installed a Radio Shack radio before I left and could listen to the world series.

The trip took six days. My best advice to anyone thinking about a long trip is - don't.. For you adventuresome types (which probable includes most Freewayers) I suggest a hard steel jackshaft or a spare, a blower is a must, and an extra new chain or a chain tensioner (see issue #6). You must also keep your oil level filled to produce maximum heat.