



Yamaha Motor Taiwan Co., Ltd. established



From right; Mr. Hsieh Wern Yuh, President of YMT, Mr. S. Arai, Director of YMC, Mr. Li Ta Hai, the Minister of Economy, Mr. H. Eguchi, President of YMC, Mr. Hsieh Ching Chung, President of Kung Hsue She Co., Ltd., Mr. Hsieh Ching Shih, Director and Mr. Hsieh Ching Chin, Director.

Recently, Yamaha Motor and its Taiwanese importer, Kung Hsue She Co., Ltd, made a joint investment to form a new company to be engaged in

the manufacture and sales of 50cc to 135cc Yamaha motorcycles in Taiwan. On March 27, a ceremony was held in Taipei to celebrate the founding of the

new company, Yamaha Motor Taiwan Co., Ltd. The new company is capitalized at 500 mil. New Taiwan Dollars with a total of 800 employees. Yamaha Motor's President, Hideto Eguchi was in attendance, along with 450 guests including representatives from the government, various mass communication media and new company and related businesses, for this memorable event.

The new company is founded on with the following corporate philosophy;

1. To contribute to the economic development of Taiwan through the development of products based on the most advanced technology.
2. To build a stronger market with research and development of products based on new trends in user needs and the active pursuit of marketing activities based on the actual conditions of the Taiwanese market.
3. To make full use of the know-how acquired by Yamaha Motor over the

years and efficient production control systems.

In order to achieve these goals, the new company will aggressively pursue the strengthening of its development and manufacturing divisions as well as the re-organization of its sales network based on its regional sales companies. In the meantime, while a dealer meeting was held in the Taiwan Factory, as a first promotional event under the new management, the company held a "Yamaha Festival" on the 10th floor of the Asia World Department Store in Taipei from March 27 to 31. The purpose of the festival was to communicate the Yamaha corporate philosophy to as many users, dealers and government officials as possible. The festival included displays of Yamaha products including even the motorcycle, ATV, snowmobile and outboard motor models unavailable on the Taiwanese market over 2600 square meters of floor space, and was attended by 100,000 visitors during the five-day run.

Engine factory completed at Iwata

Aiming at intensive, integrated production of Yamaha engines

The "Yamaha Fifth Iwata Factory" was recently completed as a new production facility and is already in operation as of April. This factory is aimed at being an intensive, integrated production facility for motorcycle, scooter and ATV engines, producing high quality engines through extremely efficient use of labor.

In addition, it is also designed to provide a comfortable and stimulating working environment for the employees.

450 employees will work in this factory producing engines at a rate of roughly 6000 a day.

On the first floor are the receiving racks for parts and sorting/shipping lines, engine sub-assembly lines, receiving racks for completed engines and shipping lines.

The second floor contains the engine assembly factory with 11 assembly lines, designated A to M, and each specializing in a different type of engine; 2-strokes and 4-strokes, large displacement and small.



The exterior of the new Fifth Factory

The third floor contains the System Control Center with its lines of computers, offices, meeting rooms, and the lobby.

In this factory a computer system controls the whole production process from parts supply down to completed product shipment. What's more, engine assembly is being automated by a large number of industrial robots for higher work efficiency. As a matter of course, these robots are also Yamaha-made. About 60% of all scooter engine as-



A close-up of one of the assembly robots. The robot is assembling a crankcase.

sembly has already been automated and 3 of the 11 lines employ a total of more than 100 robots. As with the Main Factory, the new facility is also equipped with video cameras which

The scooter engine assembly line. The assembly robots are directed to build the different engine parts by instruction from the controllers lined up in the middle of the photo.

monitor the operations of machines and workers alike to allow the staff of IE (Industrial Engineering) to analyze production systems in the attempt to discover areas for potential labor saving and thereby find ways to improve overall efficiency.

The assembly lines at the new facility also utilize an FMS (Flexible Manufacturing System) which enables one assembly line to be used for the assembly of a number of different engines simply by changing the computer programming of the robots. This means that Yamaha will be better able to engage in the type of high-model-variety, low-production-volume per model type of manufacturing that today's user needs demand.

The TZR250 becomes RD Cup Series machine

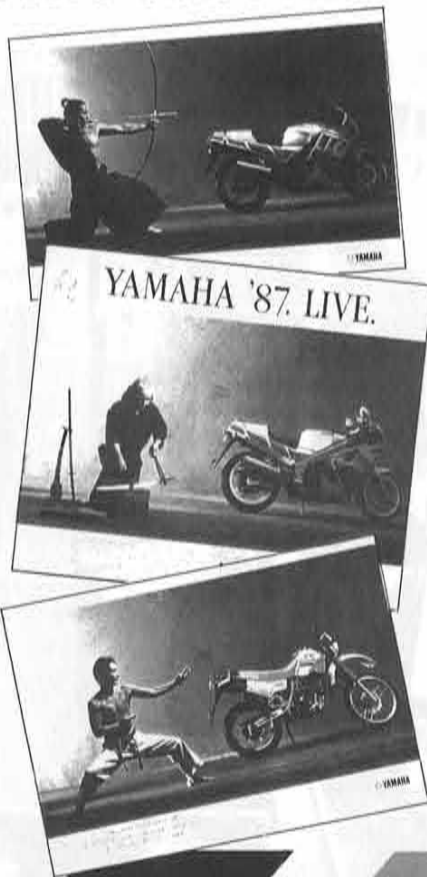


West Germany's Yamaha importer, Mitsui Maschinen GMBH, first began holding one-make races for young race lovers ten years ago in 1978, using the XS400 as its race machine. That was the origin of Yamaha RD Cup Race Series. The winner of the 1978 Cup Race, Martin Wimmer, used this opportunity to launch a pro career and now is a top rider in

the World GP 250cc class riding for Marlboro Yamaha Team Agostini. In the commemoration of the 10th anniversary of the founding of this RD Cup Series, the new machine to be used in this season's West German series is the racy TZR250. Perhaps this year will see the birth of another great talent like Wimmer from this exciting series.

German Art Directors Club Prize for ad series

By the way, in recent news we find that Mitsui Maschinen GMBH's advertising campaign for the '87 sales season was awarded a prize for excellence by the German Art Directors Club. The new advertising campaign was the result of a study of ads from the previous season that concluded that all ads in the industry were basically the same, and that none really established a clear brand image. In order to remedy this situation and create a unique brand image, a new slogan, "Perfection from tradition" was chosen and a series of ads which link traditional Japanese arts to Yamaha's modern technology, with each ad based on some logical connection between the traditional art and the particular model being advertised.



RD350LC is a big star

The 1st Industrial Fair of the Free Zone of Manaus was held May 17 - 22 at the Convention Center of Brasilia. The purpose of the fair was the promotion and showing of products manufactured in the Industrial District of the Free Zone of Manaus. The fair was organized by the Superintendency of the Free Zone of Manaus SUFRAMA; together with the "O Globo" (a daily newspaper) and "A Critica" (another newspaper). The fair was opened by President José Sarney and four of his ministers, as well as numerous authorities of the Brazilian Government. YMDB prepared a booth for Yamaha Motor da Amazonia Ltda.

to show its products to a variety of visitors, including users, and public and government authorities. The big star of the Yamaha booth was the RD350LC, production of which began, in Brazil, at the end of 1986, at the Yamaha plant in Manaus. This fair was also held in commemoration of the 20th anniversary of the creation of the Free Zone of Manaus, an area in the capital of the Amazonas State, established to promote the development of this region which lies a distance of 2,800km from São Paulo, where the Brazilian Government offers incentives and benefits for Industries that decide to build factories here.

BRAZIL



From left; Mr. Romulo de Paula Nunes - President of EMAMTUR-Amazonas State Tourism Agency, Mr. Moacyr Alberto Paes - Manager of Governmental Relationship of Yamaha, Mr. José dos Santos da Silva Azevedo - Owner and Director of Importadora TV Lar and Brazilian Partner and Director of Yamaha Motor da Amazonia, Mr. Delile Guerra de Macedo Superintendent of Suframa - Superintendencia da zona Franca de Manaus. Mr. Hiroshi Tanaka - President of YMDB and YMDB, Mr. Yoichi Abematsu - Manager for Special Sales of Yamaha

Meeting tough JAPAN standards

Starting with the '88 Seoul (Korea) Olympics, a women's 470 class yacht competition will be included in the Olympic schedule for the first time. From March 5th to 11th a competition was held in this women's international 470 class in the water offshore of Sashima in Kanagawa Prefecture. Competitors came to the event from America, Italy, Holland, West Germany, Canada, England, New Zealand and Korea, and all of these invited sailors competed in Yamaha 470 competition models chartered here in Japan. The 470 class boat must be built under license by IYRU (International Yacht Racing Union), and the standards for their construction are so strict that there is usually only



Yamaha 470 Competition

one maker granted a license in each country. From 1985 to 1986 there were approximately 500 boats of this class built by seventeen companies around the world, and among these roughly 100 were built by Yamaha. By the way, the winners of this competition at Sashima were the team of Herndon and Goff from the U.S.A.



A Letter from a reader

Local motocross star

SAUDI ARABIA



This month we received a letter from Mr. Abdulaziz S. Hudhaif, manager of Hudhaif Bicycles in Saudi Arabia. "On March 15th, '87 National Motocross Championship was organized in Riadh. The event was attended by a big audience and received the support of local authorities and business firms. As such it was a rare occasion in which Yamaha bikes could be displayed in a dynamic way to the public. We think that the event was a good success in that respect. The young star Mr. Lee Stones won the event of the 80cc class on his YZ80 bike. He was awarded reasonably by us. He was also reported in the local motocross magazine....." We hope young Lee will continue to practice, improve his skills, and mature into a top competitor in the sport. Good luck!

Thanks for all your letters. We're receiving wonderful letters with interesting topics for Yamaha Motor News from all over the world and every letter we get helps us bring you a more informative and more useful Yamaha Motor News.

So, please keep the letters coming.

First CKD production model comes off the line

In order to begin domestic CKD production of motorcycles, Sri Lanka's Yamaha importer, Associated Motorways Ltd. founded a subsidiary company Associated Motor (Lanka) Co., Ltd. in March of 1985. At that time Yamaha Motor and Associated Motor (Lanka) signed a technical assistance agreement relating to the manufacture and assembly of motorcycles. On March 20, the first domestically produced DX100 Super Deluxe came off the line at the company's factory at Periyagoda, a twenty-minute ride from the capital city, Colombo, and the event was celebrated by a memorial tape-cutting ceremony. It is the first project in complete motorcycle assembly ever undertaken in Sri Lanka. The project has received the approval of the Ministry of Industries and Scientific Affairs and aroused high expectations in local authorities and related businesses.



Standing with the momentous first bike off the line are; (From left) Mr. Denzil Fernando, Hon. Minister of Industries and Scientific Affairs and Mr. Tilak de Zoysa (Deputy Managing Director)



In the middle is Mr. Somyos, Manager of the Special Products Division, surrounded by winners of the Long-Tail boat races. (the event was reported in 15 local newspapers)

Multi-purpose engine for boat racing

THAILAND

On February 15th, a race for "Long Tail boats" was held at the Preng Rajbamroong Temple in Samutprakarn Province. This race was organized by Siam Yamaha to promote sales of multipurpose en-



A "Long Tail boats" with MT110 A/S.

gines, especially the model MT110 A/S, as well as to demonstrate to users the quality of the Yamaha products while cultivating a new group of potential customers.

The racing was divided into the following three classes, and all the boats were equipped with MT110 A/S motors;

1. Free-style dinghy (modified)
2. Standard Dugout (unmodified)
3. Standard dinghy (unmodified)

The competition aroused a great deal of local interest and in that respect proved to be a very successful promotional activity.

Super police bike; the FJ1200



A local newspaper reports that the new Police bikes are standard machines (Photo by Jytte Bjerregaard)

DENMARK

Recently, the Danish Bureau of Police purchased 6 new '87 model Yamaha FJ1200 motorcycles. This purchase brings the total of Yamaha Police bikes owned by the Bureau to ten. While these FJ1200s are standard machines, a recent test on a highway in Odense, in which an FJ1200 raced a Porsche and built up a lead of close to 300 meters in just a few kilometers, was so impressive that it was reported in local newspapers.

Your company's "Yamaha Motor News"

At the end of last year we sent out a questionnaire concerning Yamaha Motor News at random to Yamaha importers around the world, and the findings of this questionnaire were reported in our No.1 issue this year. One of the questions we asked was whether or not you published a company newsletter of your own. In answer we received copies of Yamaha Motor Corp., USA's "Communicator", Yamaha Motor Canada's "Yamaha Promotion", "Club Yamaha News" from Mitsui Machinery Sales (UK) and "Profitably Yours" from Escorts Ltd. (India). Among these, "Communicator", "Yamaha Promotion" and "Profitably Yours" were dealer oriented and "Club Yamaha News" was user oriented, and we found all of them

to be very interesting and informative. If your company also publishes a house newsletter, please send a copy to us at Yamaha Motor News. We are very interested to learn about the news in your area.

Communicator



"Communicator", (YMUS)

Hong Leong's busy schedule of promotion, education and PR activities

On February 16, the awards ceremony was held for the promotional event, "Pick the Winners Contest", organized in conjunction with the Marlboro Badminton Grand Prix Final, and as the grand prizes, Hong Leong Yamaha Distributor Sdn. Bhd. contributed eleven Yamaha YSR80s prepared in the Marlboro color scheme. Motorcycle fans were especially delighted when present world champion Eddie Lawson appeared on stage at the ceremony riding one of these YSR80s. As the season progresses, HLYD hopes to hold more such promotional events in cooperation with Godfrey Phillips (M) Sdn Bhd/Marlboro.



YSR80s in Marlboro color scheme

YSTS for MARA

As a part of its ongoing assistance to the Malayan educational organization, MARA, HLYD conducted its third YSTS (Yamaha Service Training School) from February 16 to the 21 at the Wisma HLY office for the purpose of raising

the service standards of existing Bumi (Malayan) repair shops. In attendance at the course were the owners of 6 pre-selected Bumi motorcycle repair shops and 3 representatives from other companies, IKK, Sungei Buloh and Securicor (M) Sdn Bhd. The 6-day course consisted of lectures and practical training in

all areas of service operations, as well as study tours of the HICOM engine assembly plant, the AAP parts manufacturing plant and the HLYM body assembly plant. For all the participants it was their first chance to attend such a training session, and they unanimously praised its value



YSTS for MARA

and the highly organized nature of the curriculum.

Dealers trip to Thailand

In a big show of appreciation for its outstanding dealers, Hong Leong Yamaha invited 50 top motorcycle dealers and 20 top parts dealers from the previous year on a trip to Thailand, to reward them for a

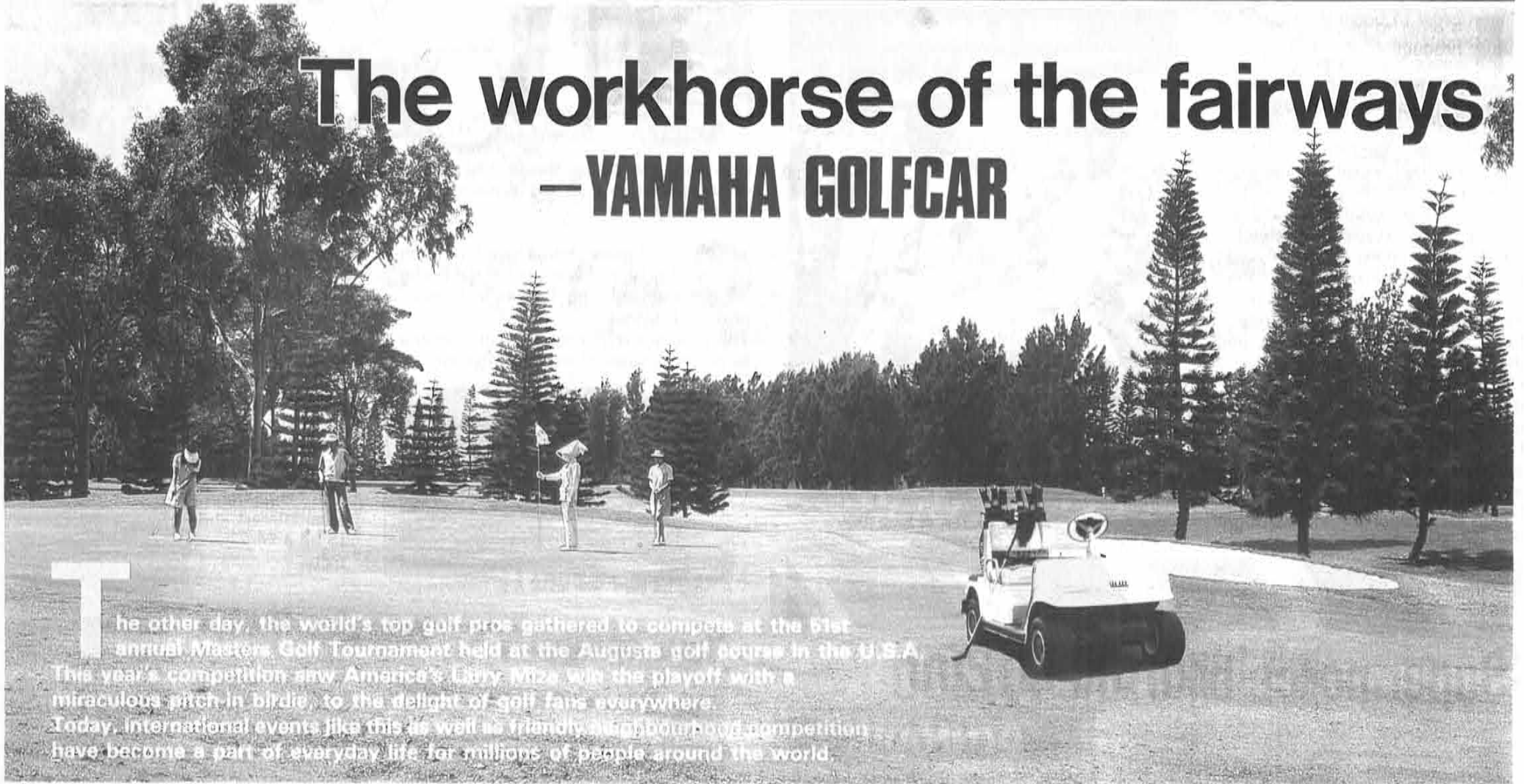


Dealers trip to Thailand

year of hard work and, at the same time, to encourage even better sales results for the coming season in an atmosphere of full harmony. In attendance from Hong Leong Yamaha were Managing Director Mr. Roger Tan, Director Mr. Takada, General Manager Mr. Ron Lim and as guests were YMC's General Manager Mr. Deguchi, and Siam Yamaha's General Manager Mr. Singchai.

Here are some ways Yamaha Motor is expanding its corporate activities

The workhorse of the fairways —YAMAHA GOLFCAR



The other day, the world's top golf pros gathered to compete at the 61st annual Masters Golf Tournament held at the Augusta golf course in the U.S.A. This year's competition saw America's Larry Mize win the playoff with a miraculous pitch-in birdie, to the delight of golf fans everywhere. Today, international events like this as well as friendly neighbourhood competition have become a part of everyday life for millions of people around the world.

Although golf may seem like a new sport, it is actually one with a surprisingly long history. The oldest historical document using the word "Golf" is a record from the Scottish Assembly dating back to 1457. Considering that this record tells of the prohibiting of golf playing by people between the ages of 12 and 50, we can assume that the game had already become a favorite pastime of the common citizen. Later, golf destined to become the sport of kings and nobility. Along with the royal patronage came a refinement of the clubs, balls and courses that elevated the game to an elite sport only the rich could enjoy. What finally made golf a sport that the public could enjoy once again was the development of techniques for the mass production and recycling of golf balls. It was in 1846 that a hard rubber ball (one-piece ball) was invented to replace the expensive leather ball stuffed with down that had been in use up until that time. Then in 1898, a new type of wound ball made with rubber strands wrapped around a core material was developed and popularization of the sport got underway.

An attractive vehicle for private properties that is not an automobile

It is interesting to note, however, that the golfcart that one sees on any golf course today was not always as popular as it is now. First invented in 1945, the golfcart was originally meant as a vehicle to help the physically handicapped who had trouble walking to be able to enjoy the sport, and at first, one needed an excuse written by a doctor in order to use a golfcart on the course. In fact, this rule still exists today on some courses in England and Australia. But, the

last 15 years or so have seen the widespread acceptance of the golfcart as a workhorse of the sport.

It was recognition of this growing market overseas, along with a new domestic market represented by the opening of the "Tsumagoi" sports facility and "Sportsland Sugo", that prompted Yamaha Motor's Power Products Division to begin development of a golfcart that would be the type of fun-filled vehicle such sports facilities would demand, and at the same time would stand in a category of all its own, separate from the automobile.

Yamaha set about to develop two types of models, an electric-powered one and a gasoline-powered. The electric golfcart had the advantages of being quiet and exhaust-free, but the disadvantage of a short charge-life. On the other hand, the gasoline golfcart had power and the advantage of good fuel economy. Recent improvements that reduce its noise level have contributed to the growing popularity of the gasoline golfcarts.

Based on the snowmobile engine

When beginning the development of the golfcart engine, Yamaha engineers turned their attention to the snowmobile engine as a base model. These engines had a ten-year record of proven performance in powering snowmobiles which are driven by a single accelerator action by means of a variable ratio automatic transmission. The problem came in the area of tuning. The 300cc, 24.5 horsepower snowmobile engine had to be transformed into a golfcart engine that would offer strong low-speed torque for powering along at a slow

17 - 19km per hour. In other words, the engine would have to be "detuned". Also, in order to reduce engine noise, a large silencer had to be added to the exhaust system and to the air filter, as well, thus achieving a silencing effect at both ends. Furthermore, to increase durability over 10,000km of tests were performed under



The G3-A Sun Classic; It is also used by security officers on private properties.

tough conditions such as dirt tracks. The newly developed Yamaha golfcarts were released on the domestic market in 1975, and then on the overseas markets in 1978. At present there are five models, the G1-A (gasoline 2-stroke), G2-A (gasoline 4-stroke), G2-E (electric), the Sun Classic G3 (gasoline 2-stroke) and the G3-E (electric), on the market, with the largest demand in the U.S.A. and Canada followed by Japan. Other smaller markets include Europe, Australia with Singapore, the new market.

An ever-widening range of uses

On the golf course, the golfcart plays a quiet but extremely important role. Although in some countries, like Japan, the average golfer still uses a caddy, in other countries, like the U.S., caddies are used primarily by pros, while the average golfer will either ride a golfcart or pull a cart by himself. The convenience that a golfcart offers the golfer is obvious, but it is interesting to note that it also offers several merits from the standpoint of the course management as well. The unique features of Yamaha golfcarts include;

- A design based on easy and simple driving operation. The power unit is driven forward/backward smoothly with the accelerator operation only, and a special system prevents the golfcart from exceeding the set speed limit.

- Cruising quietly at a speed of 17 to 19km/h, these golfcarts will not disturb their surroundings. And golf courses are always averse to noise.
- Excellent gasoline/electric consumption efficiency.
- Simple maintenance.
- A feel of high-quality combined with outstanding durability.
- It doesn't damage turf on the course and it's also good for course maintenance.
- A labor saving vehicle that speeds up course maintenance and playing time, which increases the total number of players the course can handle; a great advantage in golf-course management.

Golf is a sport which can be enjoyed by young and old, men and women, alike. Yamaha Motor's golfcarts are expected to find an ever expanding market in the future. From June of next year, the newly established Yamaha Manufacturing Corpora-



A land-car in use at Sportsland Sugo. This land-car provided the base from which Yamaha golfcarts were developed. (for sale on the Japanese domestic market).

tion of America will begin production of golfcarts at its new factory in Atlanta, Georgia, U.S.A.

And the use of golfcarts is not limited to the golf course. Golfcarts are proving themselves to be a convenient and valuable means of transportation for people in closed communities such as resort areas and communities for the elderly for shopping and neighbourhood visits. They serve as escort vehicles for VIPs at airports and security guards also use them to patrol private properties, campuses and parking lots. At last year's Vancouver Expo, golfcarts were even chosen as transport vehicles for machinery around the Expo grounds.



A 4-stroke G2

For the sound advancement of marine sports

The recently organized Yamaha Osaka Cup Race is part of Yamaha's comprehensive marine sports support activities.



Yamaha Yacht School/Junior Yacht School

In the nearly 30 years since the launching of its first boat in 1960, Yamaha has engaged in various kinds of activities aimed at encouraging the sound growth and development of marine sports. Among these there have been services for would-be motorboat or sailboat owners, facilitating a new demand creating program, such as:

• **Boat License School**

In Japan, a license is necessary for the operation of a motor boat, and this school is designed to teach the basic knowledge and skills necessary to get such a license.

• **Yamaha Yacht School**

This is a school to teach the basic theory and practical skills necessary for dinghy users to enjoy sailing. There is also Junior Yacht School for children.

Also, as services for those people who have already owned a boat or yacht, Yamaha has offered;

• **YSA (Yamaha Sailing Association)**

A nationwide organization for Yamaha dinghy owners, YSA holds annual All Japan Championships for the Seahopper and other dinghy makes.

• **Boat Fishing Contest**

A national contest held once a year for fishermen who own a Yamaha boat.

• **Dinghy and Cruiser Races**

Yamaha also sponsors many popular races for Yamaha sailboat owners.

• **Boat & Yacht Cruising**

Day cruising and long-distance cruising events for Yamaha boat and sailboat users.

In addition to these services, Yamaha also supports a wide variety of marine sports, such as sponsorship of racing teams for international races (The YR41 "Super Witch" won the D class at the '82 Pan-Am Clipper Cup Race), and title sponsorship of this



Yamaha Minihoppers. This model and Duckling are used as training boats in Yamaha Junior Yacht School.

year's Yamaha Osaka Cup Melbourne/Osaka Double-handed Yacht Race, in order to promote an understanding and appreciation of marine pleasure sports in an ever growing audience.

In pursuit of the better enjoyment of marine sports

Among these various marine demand-creating activities, it is those concerning sailboats that are receiving the most attention in the island nation of Japan. In addition to its fundamental job of providing the market with high quality products, Yamaha undertakes a program of wide-reaching promotional activities, including teaching the "how-to", develop better environmental conditions for boat sailing and encouraging the growth of sailing clubs, all aimed at creating a fuller marine sports life for everyone. When it comes to the "how-to" aspect of boat sailing, there may be no better places to master the essentials than the Yamaha Yacht School.

In 1960, Yamaha became the first maker to undertake the production of FRP boats, in Japan and the resulting availability of eco-

nomical, small-class sailboats on the market soon led to an increase in the number of young people enjoying dinghy sailing. Until then, whereas yacht races had long been popular among student or company yachting club members, it had not yet become a common practice among the average population. In truth, there were few people who even knew how to handle or enjoy a sailboat. In light of this situation, Yamaha felt the need to begin new promotional activities campaign in 1972 which would both encourage the growth of sound marine sports and, at the same time, function to create new demand in the marine market. This was the birth of the Yamaha Yacht School, which in the 15 years since has educated more than 10,000 people from all over the country to the joys of the sea.

The school curriculum includes;

1. **Yachting Room:** Before actually getting on board a sailboat, students learn the basic knowledge they will need from movies and miniature models.
2. **Dinghy Course:** This course provides useful knowledge and practical skills a dinghy user will need to enjoy safe sailing.
3. **Cruiser Course:** This course acquaints students with the techniques necessary for off-shore cruising in a cabin-fitted yacht.
4. **Junior Yacht School:** This is a boat sailing school for children which bases its curriculum on the slogan; "Training the body and mind through boat sailing"

An educational experience for boys and girls

Included as a part of the Yamaha Yacht School program since 1979, the Yamaha Junior Yacht School has received particular recognition as an educational experience for boys and girls. Designed for children from ages of 8 to 12, the Junior Yacht School takes the students through three classes; Basic, Master and Expert. The school is held in four locations around Japan, with each having an enrollment of about 40 students. As instruction boats, the school uses the Yamaha 10 (Duckling) and Yamaha 11 (Minihopper). By the way, one of the boats to finish the demanding trans-Pacific crossing of the recent Yamaha Osaka Cup, the "Heart of Glico", was skippered by Mr. Okamoto, former



Junior Yacht School. In this school, boys and girls are taught, first of all, how to become familiar with water.



A guide and textbook for Junior Yacht School.

chief instructor and project leader of the Yamaha Junior Yacht School for five years and co-skippered by Mr. Uno, one of graduates of the first Yamaha Junior Yacht School back in 1979. By completing this month-long two-handed race, one could say they passed the ultimate test in teamwork under pressure.

A questionnaire filled out by the family of Yamaha Junior Yacht School students showed that daily life habits improved after attending the school, the children became healthier, more inclined to stick to a task, more cooperative when working with others, etc., showing improved overall maturity both physically and mentally.

The Yamaha Junior Yacht School is a good example of a promotional activity which fulfills Yamaha Motor's policy of encouraging the spread of enjoyable marine sports while also, in the long run, creating fans who will learn the advantages of Yamaha products, use them faithfully and spread the Yamaha brand name to others.



In Yamaha Yacht School lectures are given by means of miniature models and textbooks.

YAMAHA TECHNOLOGICAL HIGHLIGHT

YZR500 equipped with the Aluminum Deltabox Frame



A landmark in the development of supersport bikes

The Aluminum Deltabox Frame

Until recently, the common motorcycle user looked upon the frame as nothing more than the base structure to which held the engine, suspension, handlebars, etc., in place. However, in the world of racing the importance of frames has long been recognized. Not only does the weight of the frame have a big influence on the power/weight ratio, the rigidity of the frame also is an important factor in the reliability of such operations as cornering.

Yamaha's aluminum deltabox frame is a product of the advanced technology put to use in the road race works machine "YZR500", the bike that powered Kenny Roberts and Eddie Lawson to world championship crowns.

The basic image of the present deltabox frame already existed in the minds of Yamaha's development staff back in the '70s. In 1980 the search for lighter materials led to the adoption of an aluminum frame on the YZR500 for the first time. Then, with the adoption of V-4 engine on the YZR500 in 1982 the frame was re-designed to a type very close to the present deltabox frame. It was the next year, 1983, that saw the appearance of the present deltabox frame design, and every year since it has been improved, making for a 30% reduction in weight and a 50% improvement in torsional rigidity over the former YZR500.

Now the deltabox frame has been fed back not only to "YZR Series" and other 2-stroke models, but also it plays an important part in the realization of the "Genesis Concept" in the 4-stroke "FZR Series" giving a big boost to the performance and popularity of Yamaha's supersport machines.

The frame and its rigidity

While being driven a motorcycle frame is under stress from a number of forces;

1. Stress from the road surface
2. Stress from the driving power (of the engine)
3. Stress from drive manipulation (braking, gear shifting)
4. Side stress (cornering force, camber thrust) etc.

A frame with high rigidity is better able to resist distortion resulting from these various forces.

For example, when you lean a motorcycle to take a fast curve with speed, a flexing of the frame and rear arm occurs which results in prolonging of the relay of force from the rear tire to the head pipe. In other words, there is a delay in response. The more rigid the frame is, however, the smaller this delay will be, meaning that the machine will respond

more quickly to the operational actions of the rider. When leaning into a curve, the more quickly motion force is transferred from the rear tire to the head pipe, the more accurately the rider will be able to control his machine. Therefore, the more rigid the frame, the better "feel" the rider will have for the movement of the machine. And the greater "unity" will exist between the movement of man and machine.

structurally superior, whether it is made of aluminum or steel.

Also, because of the freedom of the deltabox frame's design, a smaller number of parts are necessary to achieve a frame with the desired rigidity and strength (Fig.2).

High degree of freedom possible in choosing plate thickness and shape variations
Box width can be set freely

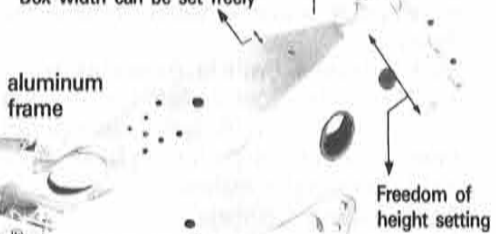


Fig.2 The aluminum deltabox frame

Characteristics of the deltabox frame

One of the structural characteristics of the deltabox frame is that the portion connecting the head pipe to the rear pivot has been made as straight as possible, in order

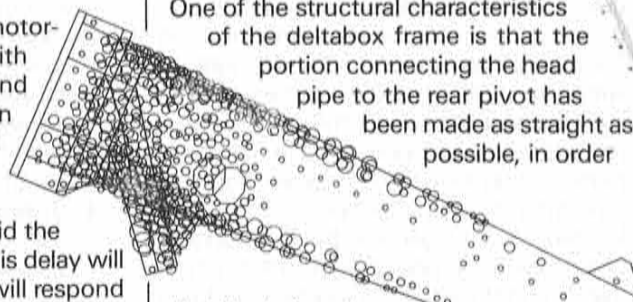


Fig.1 Shocks from the road concentrate in the area of the head pipe as stress. The deltabox frame distributes this stress over a larger area.

to increase rigidity. Another characteristic is that the part of the frame that attaches to the head pipe has been made as wide as possible, giving it the appearance of a triangular "delta" when viewed from the side.

When riding, shocks from the road surface tend to concentrate themselves in the form of internal stress at the point of connection between the frame and the head pipe. The fact that this point of connection has been made as wide as possible on the deltabox frame, giving it the advantage of distributing this stress over a larger area. (Fig.1) The deltabox frame also features the highly stress-resistant monocoque structure. These features make the deltabox frame

Characteristics of aluminum construction

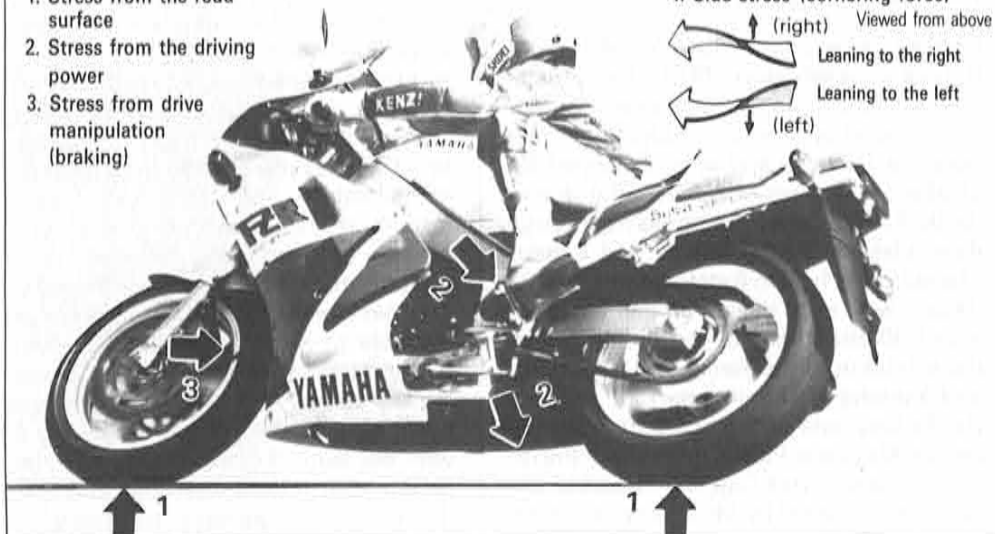
In the same manner that a person must expend extra energy when running with a load, the engine cannot perform to its fullest potential, if the body weight of a motorcycle is overly large. In this regard, the fact that aluminum as a material weighs only 1/3 of steel, and if you don't consider the factor of higher cost, it makes an excellent material for frames. What is more, the rolled sheet aluminum that is used in the deltabox frame has excellent tensile strength comparable to steel.

One of the weak points of an aluminum structure, however, is the fact that an aluminum weld is only half as strong as a steel weld. To accommodate for this weakness, Yamaha makes wide use of designs that require minimum welding, and increased plate thickness in welded parts, as well as MIG (Metal Inert Gas) automatic welding for high quality, even-strength welds. All of these measures ensure strong, reliable welds.

Typical stresses a motorcycle receives while running

1. Stress from the road surface
2. Stress from the driving power
3. Stress from drive manipulation (braking)

4. Side stress (cornering force)
 - (right) Viewed from above
 - Leaning to the right
 - Leaning to the left
 - (left)



World's first motorcycle expedition to the North Pole

Mr. Kazama and his modified TW200



A log of the expedition

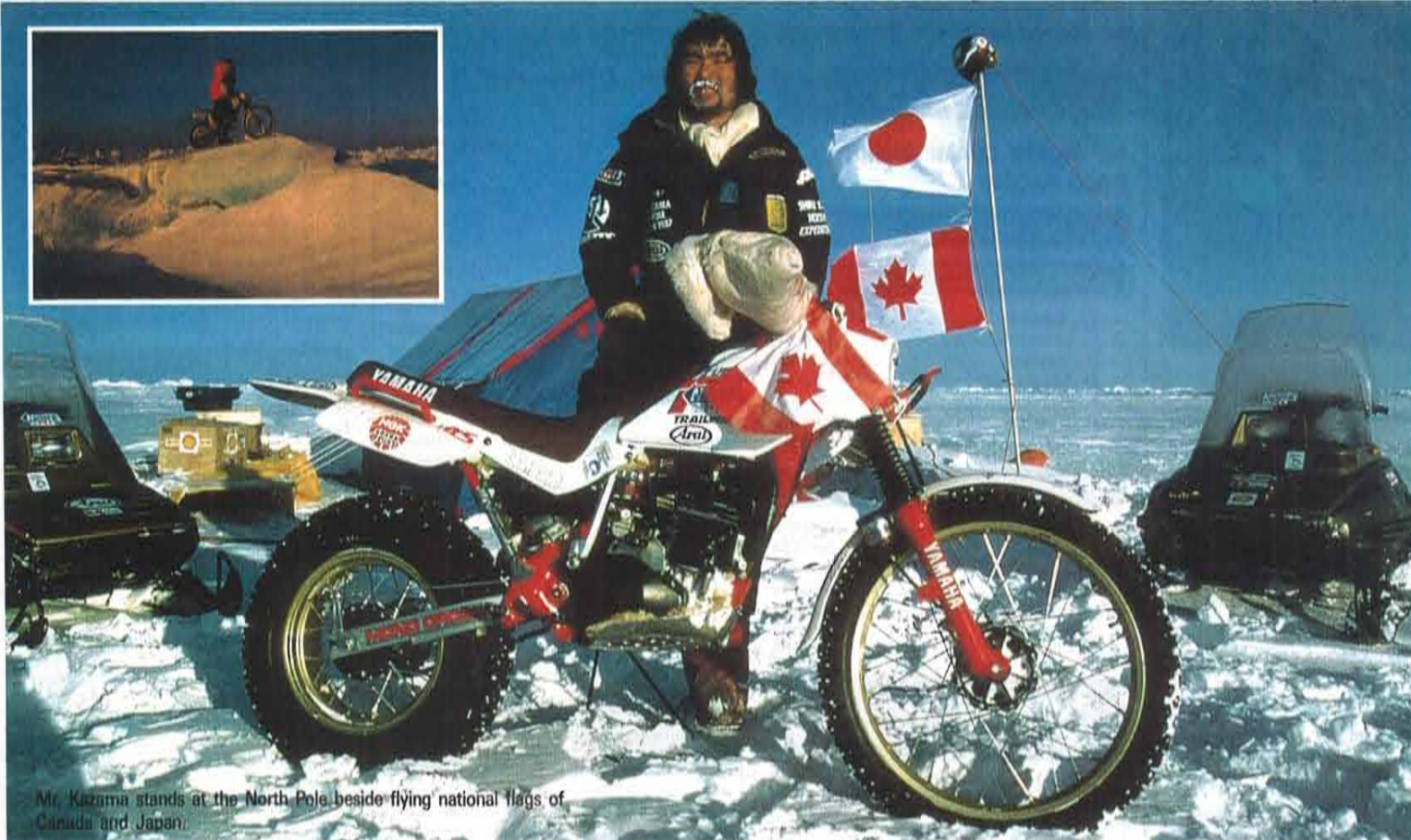
- Mar. 7 : The expedition party leaves their base camp at Resolute for Ward Hunt, the northernmost island off Ellesmere Island, Canada.
- Mar. 8 : At 11:00, he starts from Ward Hunt Island together with 4 support persons driving Yamaha snowmobiles. This day they proceed 5km to the North.
- Mar. 11 : They make camp at a position North Latitude 83°12', about 12km from Ward Hunt.
- Mar. 12 : Fine weather but the temperature dives to -43°C.
- Mar. 16 : N.L.83°25' position. Still 32km from Ward Hunt.
- Mar. 19 : N.L.83°29'. About 80% of the terrain is upheaved ice zone and hard to go but all the members are well.
- Mar. 20 : Staying camp to wait out a blizzard.
- Until the 21st, the average distance covered was only 7 - 8km per day. Their path is often blocked by large formations of upheaved ices. On the 22nd, they find a plain of flat ice and run for 50km at one time. After that the average distance becomes 20km/day to the North, an unexpectedly high pace.
- Mar. 23 : N.L.84°15'. Temperature rises gradually to -37°C.
- Mar. 27 : Receives 2nd supply lift by plane.
- Mar. 30 : Finally they pass 85°.
- Apr. 1 : Reach 85°77' position.
- Apr. 4 : Pass 86° and reach 86°01'

Entering April, the temperature rises to -18°C and weather becomes unstable. The number of cloudy days and blizzards increases.

- Apr. 7 : Pass the mid point of the expedition, 86°28'.
- Apr. 8 : Proceed to 86°43' position. Daylight hours become longer and running time increases.
- Apr. 11 : 87°24'. 288km remain to the North Pole.
- Apr. 14 : Pass N.L.88°. Fatigue begins to show in the leader, Mr. Kazama.
- Apr. 18 : North Latitude 89°, West Longitude 78°05'.
- Apr. 19 : The expedition keeps moving from 10:00 a.m. to 8:30 p.m.

Reach N.L.89°38', W.L.69°45'. Only 40km remains. If everything goes well, the North Pole will be reached in one more day.

- Apr. 20 : Reach North Pole finally. Expedition members and the machine are all in excellent condition.



Mr. Kazama stands at the North Pole beside flying national flags of Canada and Japan.

Photos by Hideaki Sato

On April 20th at 9:00 p.m. local time, the Shinji Kazama North Pole Expedition, the first attempt ever to reach the top of the world by motorcycle, using a modified Yamaha TW200, reached its goal in fine condition 44 days after leaving Canada's northernmost point, Ward Hunt, on March 8th. Led by Shinji Kazama (36), shopowner of motorcycle wear in Tokyo and "Adventure Rider", the expedition was forced from the start to battle its way across nearly impassable peaks of upheaved ice and dangerous crevasses in the midst of unseasonably heavy snows and temperatures that dropped to 40°C below zero. In spite of the

tough going, the expedition reached the 88th parallel by April 16th, after which they were blessed with good weather and snow conditions that enabled them to increase their pace and reach the North Pole on the 20th, verifying their position by means of the weather satellite, Argos. Of the nearly 50 expeditions in the past which have attempted to reach the North Pole, only eleven have successfully reached this difficult goal, and the Kazama Expedition is the first ever to do so by motorcycle. The first message from leader Kazama to reach the Expedition's Tokyo office read simply; "We've made it. We feel great!"



Servicing the machine is one of the most important daily jobs. "The bike is excellent. It starts up with just one or two kicks every morning" said Mr. Kazama. On this expedition Yamaha snowmobiles also played a vital role as support machines.

YAMAHA OSAKA CUP

Returning finishers acclaim a successful 10,200km race

At 7:06 a.m. on April 23, the yacht "SDC Nakiri Daio (Wave-cutting King)" crossed the finish line in Osaka Bay, 31 days, 19 hours and 6 minutes after the start in Melbourne Australia, to win the world's first international North-South trans-Pacific yacht race, the "Yamaha Osaka Cup Melbourne/Osaka Double-handed Yacht Race 1987". The victorious skippers Mr. Warwick Tompkins and Mr. Kaoru Ogimi, who had led from the earliest stages of the competition, came home first in a time that far exceeded initial estimates, to be greeted by a display of fireworks, horns from a welcoming fleet of boatmen and fireboats spraying a water-cannon salute. Following roughly 19 hours later was the yacht "Dr. Rai" in second place and in 3rd another day later came "Alstar". As of May 17, of the 64 yachts which started the race 45 have successfully crossed the finish line in Osaka, leaving 1 still enroute. As for 4 Yamaha yachts, "Tsubakuro" finished 22nd, "Oidon" 25th, "Heart of Glico" 27th and "S & B Fresh O₂" was 31st. Considering the fact that there were a good number of specially-built, race-designed and outfitted yachts in the race, and the fact

that 18 of the starters had dropped out, these four modified Yamaha production yachts have proved their durability, speed and seaworthiness in a brilliant way. At the Yamaha Osaka Cup Awards Ceremony held at Miyako Hotel Osaka on May 9, first place trophies were awarded to First Home Winner "SDC Nakiri Daio", Cruising Division winner "Reward", Racing Division A winner "SDC Nakiri Daio" and Racing Division B winner "Kirribilli". And among the finishers, "Kirribilli", "Sunchaser", Sitka (Australia), Devona (New Zealand) and Sir Isaac (U.S.A.) received special honors because of the fact that they took a time loss in order to go to the aid of another boat in distress on the course. Concerning the race itself, the comments made most often by the participants were that it was an extremely interesting race in which luck played a big hand. The new course and diversity in weather and sea conditions also gave it an aspect of adventure and demanded an extremely high level of technical expertise. All agreed that in time this longitudinal cross-Pacific yacht race would surely become one of the great classics of international off-shore racing.



▲ The first boat home "SDC Nakiri Daio" is welcomed at the entrance of Osaka Bay.

◀ Akio and Toshio, the Utsumi brothers and their production Yamaha Y35CS. Toshio is 18 the youngest entrant of this race.

▼ YMC President, Mr. Eguchi, shakes hands with one of the winners at the Awards Ceremony.

