

# Yamaha Motor Monthly Newsletter



The "YP20G" Water Pump

## *Spotlight: Power Products*

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## Power Products

# The unsung power sources - there whenever and wherever they're needed



After establishment as a motorcycle manufacturer in 1955, Yamaha Motor Co., Ltd. entered the 1960s looking to further increase its operational stability and growth potential by beginning to expand into new lines of business. The wealth of small engine technology the company had built up was applied to the development of new product lines like outboard motors and snowmobiles. "Multi-purpose engines" that could serve as individual power units for a variety of uses were one of these new lines. User ingenuity helped couple these engines with a variety of devices for use in a wide range of fields like agriculture, fishery and leisure activities. Furthermore, Yamaha Motor used these engines to develop its own products like generators, water pumps and snow throwers with solid durability and reliability that have won customer trust, and today serve in the daily lives of people worldwide. This time we introduce these unsung hard workers that Yamaha Motor calls Power Products.

## Multi-purpose engines developing in stride with Japan's economic growth

The 1964 Summer Olympic Games held in Tokyo helped trigger the start of a period of great economic growth in Japan known as the "Izanagi Boom." This booming growth extended to industries including everything from construction, manufacturing and distribution to agriculture, forestry and fishery. With its experience of success in helping to motorize coastal fishery with its outboard motors, Yamaha quickly envisioned the possibilities for multi-purpose engines as power sources for a variety of jobs previously done manually, like powering water pumps and sprayers for irrigation water, fertilizer, pesticides, etc. in agriculture, winches for hauling in fishing nets and harvesting seaweed in fishery and cement mixers and other equipment at construction sites. This led to the release of Yamaha's first multi-purpose engine, the "MT100," in 1969.

This first model was a 98cc, forced-air-cooled, 2-stroke, single-cylinder engine with a maximum power output of 2.9 kW (4.0 PS) and a maximum torque figure of 6.8 N·m (0.68 kgf·m). The MT100 quickly became popular for its performance characterized by deep torque in the low-rpm range that made the most of the flywheel effect, and features including an abrasion-resistant piston and bearings, a large-sized muffler for quieter operation, polished reduction gear teeth, a carburetor equipped with a starter for easier start-ups and a convenient grouping of the operational instruments in one place. A second model with a larger displacement called the "MT110" was released in 1971, and both of these models found use with a great number of customers in a wide variety of fields.

## **Yamaha products with multi-purpose engines appear one after another**

The success of these multi-purpose engines prompted Yamaha Motor to begin developing its own products powered by them. From 1973 into the 1980s, Yamaha expanded its areas of business by constantly releasing products in a wide range of categories, from racing karts, snow-melting agent spreaders, compact generators, golf cars and snow throwers, to water pumps, land cars, lawnmowers and other products.



Yamaha released a complete racing kart model called the "RC100" based on how one user paired an MT100 engine with an original frame to create a homemade racing kart. It became a big hit.

Among these products, the series of Yamaha racing karts, beginning with the "RC100" model launched in 1973, and the "SL Kart Races" they were used in attracted a large number of fans and became an entry-level category for the 4-wheel motorsport world where Formula 1 is the pinnacle class. During the 1970s and the 1990s, the holding of F1 Grand Prix races in Japan created a nationwide boom in kart racing. Kart racing was originally born in the U.S. in the mid-1950s and spread later to Europe and other parts of the world. Many famous F1 drivers started in kart racing, and Japanese drivers like Aguri Suzuki, Toranosuke Takagi, Kazuki Nakajima and Kamui Kobayashi would also eventually rise to become F1 drivers after careers in kart racing.

The SL Kart Races that fueled and helped realize the dreams of so many young people and drove the love of motorsport of many adults on weekends continues today throughout Japan as the "SL Kart Meeting," with Yamaha's "KT100" series of engines used to support the competition.

One line of products that certainly exemplify the multi-purpose engine's character as a power unit that can be used anywhere are the snow throwers that help people in their ongoing battle with the snow in regions like Hokkaido where it is not unusual for temperatures to drop below -10° C. After initially introducing what would be the first relative to the company's snow throwers, the snow-melting agent spreader "YS-1" in 1973, Yamaha Motor imported American-made snow throwers for a while to sell in Japan's snowbelt, only to find that they didn't fit the snow quality or use conditions well. That led Yamaha to pursue joint development of a snow thrower together with a company in the northeastern Tohoku region, and the result was the release of Yamaha's first snow thrower, the "TY-665," in 1978. Since then, Yamaha has continued to improve on its snow throwers' functions and develop new functions with the aims of making snow removal easier, quicker and more directionally precise in throwing performance. Some of the new functions are the damper mechanism that softens the shock and helps prevent damage when gravel and the like are drawn into the auger teeth, methods to prevent snow buildup in the thrower chute and mechanisms that make changing direction and steering easier. According to one of the Yamaha developers however, almost no special modifications for cold-climate operation have ever been needed for the engines in past models or the 12 models

being marketed in 2014.

"About the only thing we have ever received reports about is ice buildup at the air intake mouth, and we took care of that problem when a new OHV engine was adopted in 1997 by adding a device that sends warm air from the cooling system fan to the carburetor. As far as I know, that is the only measure that has ever been needed." This is a case that clearly shows how well Yamaha multi-purpose engines fulfill their role in the real world, where multi-purpose means they will be subjected to all kinds of uses in all kinds of environments.

## **Generators overcoming the different demands of numerous and unpredictable use environments**

Another important line of Yamaha products employing multi-purpose engines are the Yamaha generators used and loved by people around the globe. As we mentioned earlier, around 1970, Japan was in the midst of its period of high economic growth and people were surrounded by all kinds of electrical devices and appliances at work and at home in their daily lives. As such, there was a growing demand for portable electricity sources that could power their appliances in places where there were no outlets, like on city streets, at the beach or in the mountains. To answer this need, Yamaha released its first compact generator, the "ET1250," in 1973, powered by the MT110 engine. This model featured a fully automatic transistor voltage regulator (SCR type) to ensure a steady supply of electricity, excellent operability and serviceability. Its weight was also a full 10 kg lighter than competitor models and also brought it high acclaim, making it popular for use on construction sites and in a wide range of other applications.

For Yamaha's second generator model, the "EF1500," a new 4-stroke multi-purpose engine that was under development at the time was chosen as the power unit in response to calls from the market. Despite the anticipation for its completion, the engine failed to reach the production stage, and development of the EF1500 and a new engine to power it had to be started again from scratch.

The project restarted with a thorough investigation of other makers' models on the market. The developers say they memorized everything about the competitor models' sizes, materials, and even the strength statistics. The engine format chosen for the new model was a side-valve type with its advantage of a simpler structure. However, for that reason the basic design was extremely important, with no room for error. Developing it was a process of repeatedly building and testing prototypes, and after three years, the engine was complete. When the new generator was released in 1976, its engine was also released separately as the "MF180" multi-purpose engine.

However, the development trials and tribulations did not end there. When the EF1500 was taken to Indonesia for tests in preparation for the company's first export sales, what came back was a torrent of reports about breakdowns, engine seizure, metallic noise and more. Members of the development team immediately flew to Indonesia, and were surprised at the harsh use conditions that were simply unimaginable in Japan. The primary reasons for the problems were the quality of the gasoline and oil used in the Indonesian market and the unexpectedly high temperatures of the local climate. When actual running tests were performed, the gasoline would begin to boil in the carburetor and cause the engine to stop and thick layers of carbon build-up would form in the combustion chamber and around the valves. It was the team's first overseas assignment and the unexpected troubles they encountered drew their stay on for an unforeseen four months. But, eventually it was all worth the effort due to the valuable improvements made to the EF1500's cooling system, gasoline passages and



Many families find a small portable generator to be a very convenient appliance for outdoor leisure, but recently a growing number of people keep generators as a power source for disaster preparedness or emergency use.

other areas that greatly increased its reliability and durability. After these improvements, the generator passed 500-hour continuous-running tests at a room temperature of 50° C and was then marketed as the export model "EF1800," with shipments beginning in 1978.

Later in 1979, the "ET500," a more compact, personal-size 2-stroke model, was marketed and became a big hit model in the markets of Africa and other regions. Then, in 1988, new generator models using the 4-stroke OHV engine that is the main power unit in today's models were added to the lineup. From the 1990s, there were continued improvements made in model functions and product quality and numerous new variations were added to the lineup, such as low-noise models for urban environments and inverter types for providing higher quality electricity. With record sales of 180,000 units worldwide in 2012, generators have become a mainstay of Yamaha's Power Products.

## **Pumps supporting agriculture with life-giving water and waste-free efficiency**

Do you know of the term "drip irrigation?" It is a system that uses groundwater pumped up from wells and a network of specially designed tubes (hosing) to irrigate fields by dripping water, thereby giving crops just the amount of water they need. Originally conceived in the Middle East, this system is now being adopted in regions of Africa plagued with the same kind of desertification.

Before the adoption of the drip irrigation system using Yamaha pumps in the village in Senegal shown on the cover page, farm workers used to spend most of the day making hundreds of trips back and forth between the well and the fields to irrigate the crops with buckets of water drawn by hand. Now, with the drip irrigation system, all the work of irrigating the fields is done with just the water pump. As a result, the farmers' living environment has greatly improved, as there is no need to enlist the labor of the women and children for irrigation and the male workers are free to do other work. This has led many farmers to expand their crop fields to increase production and begin raising higher quality crops that bring a higher price at the market. The farmers also say that by regulating the daily running time of the pumps and volume of water enables them to get crops of uniform quality while also conserving valuable irrigation water by roughly 50%.

Cooperating with microfinance groups, local agricultural organizations and NGOs, etc. that provide training to farmers and promote the use of drip irrigation, Yamaha Motor sells and provides maintenance for Yamaha water pumps through the collaborative efforts between Yamaha's Overseas Market Development Operations (OMDO) and the local Yamaha distributors. "There are now low-price Chinese-made pumps appearing on the market, but if one of those pumps breaks down and irrigation is interrupted for a week, the whole crop of that field may be ruined as a result. In contrast, what we offer is highly reliable, durable products, a continuous relationship by visiting our customers after sales and the promise that we will come to repair our products in the case of a breakdown," an OMDO representative says with pride. A confidence and pride born of years of grassroots efforts in the field could be clearly seen on the representative's face.



At this village in Senegal, the use of water pumps in drip irrigation systems has improved the living environment like reducing the amount of irrigation water used, increasing crop yields and freeing women and children from strenuous labor.

## Message from the Editor



Hello everybody, my name is Mariko Saito, and from this month's issue I am taking over as the Editor of the *Yamaha Motor Monthly Newsletter* from Yuriko Senga. I will do my best to bring you pages that are enjoyable to read and full of useful information.

In an exhibition held at our Communication Plaza last year, there was an exhibit that explained how a generator worked and I tried a device where you turned a small electric motor manually with a handle to generate electricity by electromagnetic induction. The faster you turned the handle the brighter the little light bulb lit up, and I tried to turn it as fast as I could but I never lasted more than about ten seconds before my hand got tired. An engine-driven generator turns a hundred times faster than I could and for hours on end. Even though it may not stand out like a motorcycle or a powerboat, that experience really showed me in a direct way how generators are reliable machines that continuously do exactly what they need to do.



Next month we will look at electric wheelchairs, another form of personal mobility Yamaha specializes in that can play a big role in supporting the lives of people with ambulatory disabilities stemming from accidents or illnesses.

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