

TOKYO KEIKI INC.

Financial Results Briefing for the Fiscal Year Ended March 31, 2020 (Fiscal 2019)

June 4, 2020 President **Tsuyoshi ANDO**

The forward-looking statements contained in this material reflect the management's assumptions based on currently available information as of the date of announcement. Future changes in business environment and other factors may therefore cause differences with the actual situation.



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1. Our business



Business Overview

Marine Systems Business

Manufacture, sale, and maintenance services for marine gyrocompasses, marine autopilots, electronic chart display and information systems (ECDIS), radars, and other nautical instruments, and for satellite



Hydraulics and Pneumatics Business

Manufacture, sale, and maintenance service of hydraulic solenoid valves, pumps, motors, hydraulic systems, and electronic equipment for construction equipment

Others

-Railway Maintenance -Printing Inspection Equipment ©TOKYO KEIKI INC. All Rights Reserved



Defense & Communications Equipment Business

Manufacture, sale and maintenance service of radar warning receivers, naval gyrocompasses, submarine inertial navigation systems, inertial sensors, and microwave devices



Fluid Measurement Equipment Business

- -Manufacture, sale and maintenance service of ultrasonic flowmeters and microwave level gauges used in water supply facilities and agricultural water
- -Manufacture, sale and maintenance service for gas-based fire extinguishing systems



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Net sales and operating profits for Fiscal 2019



Financial Results Summary for Fiscal 2019

- Defense and Communications posted higher revenue and profits (for the fourth period running) following large public-sector orders and unexpected sales.
- Hydraulics and Pneumatics posted a decline in revenue and an operating loss due to sluggish Japanese & global demand for industrial machinery.

Changes in consolidated net sales and operating profit



* "Net profit" represents "Profit attributable to owners of parent".



Analysis of changes in consolidated profit and loss (Factors causing fluctuations in consolidated ordinary profit)



 Despite better sales, operating profits were undercut by poorer cost-of-sales ratio (up 1.7 points) following changes in product mix.



Changes by segment





Status of orders received and order backlog

	Amount of orders received for Fiscal 2019			Amount of order backlog at the end of Fiscal 2019		
(Million yen)	Amount	Composition ratio	Change from Fiscal 2018	Amount	Composition ratio	Change from Fiscal 2018
Marine Systems	8,958	21.8%	△0.8%	2,676	12.2%	∆4.9%
Hydraulics and Pneumatics	11,327	27.5%	∆16.2%	2,547	11.6%	∆22.1%
Fluid Measurement Equipment	3,993	9.7%	△2.6%	963	4.4%	34.6%
Defense & communications Equipment	13,670	33.2%	△25.6%	15,268	69.8%	△26.8%
Reported segment total	37,947	92.3%	∆15.7%	21,454	98.0%	∆22.4%
Others	3,179	7.7%	2.3%	430	2.0%	△19.6%
Adjustment	3	0.0%	293.8%	0	0.0%	59.5%
Total	41,130	100.0%	∆14.6%	21,884	100.0%	∆22.4%

 Defense and Communications received fewer orders, having passed the expected peak in large public-sector orders. The order backlog shrunk following major deliveries (¥1.9 billion per order).

 Hydraulics and Pneumatics received fewer orders and reduced its order backlog amid sluggish demand for machine tools and plastic processing machinery (e.g., injection molders).

Consolidated balance sheets (Main accounting items only)

(Assets)	(Liabilities and net assets)						
(Million yen)	As of Mar 31, 2019	As of Mar 31, 2020	Amount of change	(Million yen)	As of Mar 31, 2019	As of Mar 31, 2020	Amount of change
Current assets	46,124	42,695	∆3,430	Current liabilities	22,289	21,736	∆552
Cash and deposits	9,397	7,709	∆1,688	Notes and accounts payable	7,027	5,800	∆1,227
Notes and accounts receivable	13,723	15,262	1,539	Short-term loans payable	10,757	11,692	935
Electronically recorded monetary claims	5,316	4,404	∆913	Provision for bonuses	1,121	1,123	1
Inventories	16,990	15,001	∆1,989	Non-current liabilities	6,579	3,197	∆3,382
Accounts receivable	76	81	6	Long-term loans payable	4,954	1,076	∆3,878
Other	624	240	∆384	Net defined benefit liability	721	1,229	508
Non-current assets	12,224	11,882	∆342	Total liabilities	28,868	24,933	∆3,934
Tangible assets	7,246	7,004	△242	Shareholders' equity	28,137	29,065	928
Intangible assets	0	0	_	Retained earnings	21,528	22,542	1,013
Investment securities	3,401	2,991	∆410	Total net assets	29,481	29,644	162
Total assets	58,349	54,577	∆3,772	Total liabilities and net assets	58,349	54,577	∆3,772

Inventories plunged following major deliveries in Defense and Communications

Long/short-term loans payable decreased ¥2,940 million following repayments of long-term loans.

Net defined benefit liability increased due to low stock prices.



Changes in consolidated cash flows (Operating CF/ Investment CF/ Financial CF/ FCF)



*Free Cash Flows (FCF): Computed simply by adding cash flows from operating activities and cash flows from investing activities.

 Operating CF soared following downturn in inventories. Financial CF plunged following loan repayments.

FCF rose for 3rd period running amid deliveries of large orders in Defense and Communications.

Net sales and operating profit forecast



* "Net profit" represents "Profit attributable to owners of parent".



Analysis of changes in consolidated profit and loss (Factors causing fluctuations in consolidated ordinary profit)



The impact of COVID-19 will depend on how the situation progresses.



Capital investment, R&D, Depreciation







Changes in major indicators

	2016/3	2017/3	2018/3	2019/3	2020/3	2021/3
E P S (Yen) (Earnings per share)	15.05	8.54	67.61	117.19	86.76	93.47
B P S (Yen) (Book-value per share)	314.11	324.81	1,695.16	1,764.15	1782.35	—
Equity ratio (%)	51.3	51.6	48.3	49.8	53.5	—
R O E (%) (Return on equity)	4.7	2.7	4.1	6.8	4.9	5.2
ROA (%) (Return on assets)	3.9	2.4	2.7	4.6	3.6	_

*Note: The Company has implemented consolidation of common shares at a rate of 1 share for every 5 shares effective October 1, 2017.

• Equity ratio:

Up 3.7 points from end of previous period; exceeded 50% for first time in 3 periods.

 Return on equity (ROE): Down 1.9 points and dipped below 5%, due to lower operating profit margin and higher equity ratio.



Profit returns to shareholders

[Basic policy]

Implement stable returns to shareholders while maintaining balance with financial capacity.

Regarding the use of internal reserves

Allocate investments aimed at "new technology research" "new product development," "productivity improvement," "overseas base expansion," "human resource development," "organizational capacity building," "management resource enhancement," etc., which serve as the sources for profitability (earning power), in order to achieve sustainable growth and improve medium-to-long-term corporate value, while taking capital efficiency into account.

Dividend for the last five years and forecast for Fiscal 2020

	2016/3	2017/3	2018/3	2019/3	2020/3	2021/3 (Forecast)
Annual dividend per share (yen)	5.00 (Common, 4 + Commemorative, 1)	4.00	20.00	25.00	25.00	25.00
Payout ratio (consolidated) (%)	33.2	46.8	29.6	21.3	28.8	26.7
Total return ratio (consolidated) (%)	39.8	46.8	37.1	25.6	34.7	

*From Fiscal 2017 (2018/3) onward, dividend amounts are those after consolidation of shares. (Dividend amount before consolidation of shares is 1/5 of amount shown.)

Status of recent acquisition of treasury shares

	May 2014	May 2015	Nov 2015	Nov 2017	Feb 2019	Nov 2019
Total number of reacquired shares (yen)	310,000	300,000	335,000	58,000	76,800	84,700
Acquisition cost (million yen)	84	84	84	85	85	85

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3. Medium-term Management Policy and Business Plan



Medium-term Management Policy

Basic policies and growth strategies

Goals

- (1) Expand business areas
- (2) Promote globalization
- (3) Sustainably Strengthen existing business

Act as market leader by developing proprietary products that deliver high value and contribute to the SDG agenda.

Drive revenue through practices that contribute to safety and the environment, and moreover, serve stakeholders by delivering sustainable growth and enhancing enterprise value in the medium to long term.

Targets:

(1) Operating profit to sales of 8% or more(2) ROE of 8% or more



SDG initiatives

- Contribute to farm automation
- Contribute to greenhouse gas reduction
- Contribute to disaster management
- Contribute to water resource management

*Due to rapid changes in the external environment, the term of implementation will be changed as needed.





Tasks: ROE analysis

		2016/3	2017/3	2018/3	2019/3	2020/3
R	OE	4.7%	2.7%	4.1%	6.8%	4.9%
	Return on sales (ROS)	2.9%	1.7%	2.6%	4.2%	3.0%
	Total asset turnover (TAT)	0.9	0.8	0.8	0.8	0.9
	Financial leverage	1.9	1.9	2.0	2.0	1.9

Tasks

[ROS: KPI for profitability]

Profitability is poor; our growth strategy must drive down costs and improve profitability.

[TAT: KPI for asset efficiency]

Our TAT is about average for a manufacturer. But we must use assets more efficiently by improving the cash conversion cycle (accounts receivable turnover period + inventory turnover period).

[Financial leverage: KPI for financial health]

We remain financially healthy, with over 50% equity ratio.

Priorities

Improve profitability through new businesses and other means; improve asset efficiency 3. Medium-term Management Policy and Business Plan

Three-year Business Plan starting from Fiscal 2020 (2021/3)



*Targets: Consolidated operating profit to sales of \geq 8%, ROE of \geq 8% (>cost of equity)

(Million yen)	2020/3	2021/3	2022/3	2023/3
Net sales	47,440	46,700	46,600	50,100
Operating profit	1,875	1,930	2,110	3,620
Ordinary Profit	2,011	2,050	2,380	3,870
Net Profit	1,425	1,530	1,790	2,880
Operating profit margin	4.0%	4.1%	4.5%	7.2%
← ROE	4.9%	5.2%	5.8%	8.7%

*The 3-year Medium-term Business Plan will be reviewed every year (rolling plan).

3. Medium-term Management Policy and Business Plan

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Three-year Business Plan by Segment



Highest consolidated net sales to date is 68,178 million yen (Fiscal 1991).

3





3. Medium-term Management Policy and Business Plan



[Key products to lead growth]

Solution for easier farm work: Straight-line assistance for agricultural vehicles



SDG challenge

Japan's agricultural population is shrinking and graying rapidly. To ensure a stable supply of produce from farms, there is an urgent need for smart farming, whereby farmers can farm more efficiently with less effort.

The product Linear-motion assistance for agricultural vehicles



Using technology for steering a tractor along a straight path, the AG-GEAR Series spares farmers the difficulty of performing this onerous task.

- Accurate linear tracking is achieved through our proprietary control system, which combines inertial sensor modules and GNSS* data.
- Users can modify the system to the tractor specs and the condition of the firm field
- Easy to use: You just program the route.

%GNSS: Global Navigation Satellite System

3. Medium-term Management Policy and Business Plan



[Key products to lead growth]

Solution for safe operation of trains by preventive inspections and maintenance works: Rail inspection car/equipment



SDG challenge

- -Japanese railways face a shortage of maintenance workers due to the dwindling labor pool and changing career aspirations. This situation creates an urgent need for better automation.
- -Many developing countries see high-speed rail as a means to cut their greenhouse gas emissions. However, they lag behind developed countries in terms of rail maintenance/safety systems.

The product Ultrasonic rail inspection car



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The product uses ultrasonic technology to nondestructively testing for flaws in the interior of the rail, which is hidden from the naked eye. Using imaging and laser technology, the product can synchronously measure lateral and corrugate wear on the rail surface.

- Far quicker than manual inspections, the product can cover plenty of track in a short time.
- The product boasts impressive uptake among JR and other private rail operators.
- As Japan's only producer of rail inspection cars, Tokyo Keiki Rail Techno Inc.(TRT) dominates the market and is expanding abroad.



[Key products to lead growth]

For small/medium rivers to facilitate floodwater control: Crisis management water gauge system



SDG challenge

Due to climate change, Japan experiences torrential rainfall every year, creating an urgent need to protect the public from flooding. However, gauges that can detect a sharp rise in water level are expensive and unsuitable for small to medium sized rivers.

The product Crisis-oriented microwave water-level gauges



The product is designed specifically for flooding crises, as part of a MLIT project for controlling small-medium river flooding.

The gauge system consists of a water-level gauge sensor, battery (including lithium and solar cells), and a communication system. The system activates when the river floods, and is inexpensive.

- Minimal maintenance required (lasts over 5 years unpowered.)
- Compact size enables installation on bridges
- Low initial cost
- Low running costs. To minimize communication costs and power consumption, the product only activates once the river level exceed a specified level, and once activated, it intermittently measures the water level and uploads the data to a server.



[Key products to lead growth]

For the production of future generations of semiconductors: Microwave amplifiers (SSPA unit)



IoT is facilitating the miniaturization of semiconductor production, accelerating the development of next-gen semiconductors.

More miniaturization means greater density, frequency (speed), versatility, and throughput, which should enable low-carbon, low-cost production.

The product

SDG

challenge

Microwave amplifiers for generating plasma (SSPAs)



SSPAs generate plasma for the plasma etchers used in production of next-gen semiconductors. In this way, the products contribute to ever more miniaturized semiconductor production.

- SSPAs use semiconductor technology to finely tune the plasma, enabling users to increase miniaturization and minimize damage.
- SSPAs reduce maintenance costs thanks to their long-term stability and reliability.
- SSPAs are compatible with a variety of signal sources.

*SSPA: Solid State Power Amplifier



References

 Quarterly changes in net sales and operating profits



Quarterly changes in net sales

(Million yen)







Quarterly changes in operating profits

(Million yen)





TOKYO KEIKI, INC. Glossary of terms used in the Financial Results Briefing Materials



	Term	Description
Mari	ne Systems Business	
1	Gyrocompass	A gyrocompass applies the mutual effects of gravity, the earth's rotation and the characteristics of the "gyroscope". Its key features are: (1) indication of true north (magnetic compasses show magnetic north), (2) capability to serially output heading signals to other equipment, (3) capability to be positioned anywhere, (4) resistance to hull magnetism and other disturbances. As the critical "sensitive element" gyro rotor rotates continuously at high speeds for long periods, regular maintenance is recommended and in cases of severe wear due to cumulative operating time, replacement (overhaul) of the gyro rotor may be required. Periodic maintenance services are an integral part of our Marine Systems business.
2	Marine autopilot (automatic steering device for ships)	The autopilot receives signals from heading sensors such as gyrocompasses and uses them to automatically control the rudder to efficiently navigate towards the preset direction. The Autopilot PR-9000 Series, a key product of our company, boasts a large color LCD display as well as repeater and various navigational data displays that reduce the burden on crews and contribute to safer navigation. The PR-9000 features improved system independence and incorporates functions that strengthen operational monitoring of equipment to improve overall safety and reliability. In addition, the autopilot's route control function (ACE) automatically plots the route toward the next destination by adjusting only the heading to that destination from the current position and factors in estimated disturbances (tidal activity), departure from route, etc. to provide optimal control of the rudder in guiding the vessel on the newly designated route. This reduces departure from routes, shortens voyage, reduces unnecessary steering, and reduces the load of nautical operations, thereby contributing to safety and energy conservation. The ACE function can now be added to the autopilot of existing ships by using the course control unit.
3	Electronic chart display and information system (ECDIS)	The electronic chart and display information system, or "ECDIS", has functions for displaying the electronic navigational chart (ENC, electronic information needed for navigation safety, such as on position, course, speed, etc., in addition to the information contained in traditional nautical charts) and the ship's current position on the same screen and also superimposes other information (radar, planned routes, etc.) as well. Starting July 2012, its use has gradually become mandatory.
4	Electronic chart table	The electronic chart table is a large, horizontal multi-touch screen for nautical navigation, which multiple users can operate and view. Unlike conventional ECDISs, this device (which is sometimes called a "planning station") comes with features that streamline and optimize nautical navigation and planning. For example, users can add handwritten notes and link the device with a weather prediction system. The device can also be connected to a high speed network, enabling efficient and accurate ship-to- ship or ship-to-land communication. Thus, the electronic chart table provides a greater range of possibilities than ECDIS with capabilities to satisfy sophisticated nautical needs.



	Term	Description
5	Fiber optic gyroscope (FOG)	A fiber optic gyroscope detects mechanical revolutions using optical interference. A coiled optical fiber is used for the sensor. Two beams from a laser are injected into the optical fiber but in opposite directions. Due to the Sagnac effect, the beam travelling against the rotation experiences a slightly shorter path delay than the other beam. The resulting differential phase shift is measured through interferometry, thus translating one component of the angular velocity into a shift of the interference pattern which is measured photometrically. Our FOG products are used in attitude and heading reference systems for patrol helicopters and attitude-sensing systems for tunnel excavation. We are currently pursuing the sales of FOG compasses for merchant ships. Unlike mechanical gyros, a key feature of the FOG is the absence of moving parts, leading to its high reliability.
6	Digital course recorder	A course recorder is a device that automatically records the ship's heading and rudder angle information over time. Conventional course recorders are mechanical devices that continuously pen records on a rolled record sheet. The digital course recorder does not use pens or record sheets but instead records and stores the ship's heading and rudder angle information in memory which reduces running costs and contributes to the environment. The digital course recorder's large LCD display also allows handwritten input to provide operability similar to the traditional way of note taking on record paper.
7	Autonomous ships	The global shipping industry faces challenges such as crew shortages and numerous marine accidents caused by human error. Autonomous ships are seen as a solution to these problems. Japanese shipping is no exception: Japan wants to develop a fleet of autonomous ships by 2025 to address these problems, as well as to help the country's shipbuilding and ship machinery/ equipment industries dominate the market. We are developing technology for the autonomous ships of tomorrow through several projects, including a MLIT public-private that involves researching collision risk and ship automation.
Hydı	raulics and Pneumatics	Business
8	Direct drive pump control systems	This direct drive pump control system improves energy efficiency and economizes power consumption by optimally controlling the rotation of the servomotor that drives the hydraulic pump. The system maintains pump delivery pressures and flow rates at optimum levels by controlling the torque and speed of the servomotor, resulting in significant energy savings in the hydraulic systems of injection molding and other machinery.
9	Monitor and controller (for construction machinery)	The monitor and controller responds to joystick command signals of hydraulic excavators and other construction machinery to control proportional solenoid valves and display the operational status of equipment. We offer CAN*-compatible controllers, monitors (displays), and sensors for construction machinery. Multiple devices can be linked, allowing real-time communication of information necessary for controlling the machinery. *CAN (Controller Area Network) is reliable network technology developed for the automotive industry.



	Term	Description
Flui	d Measurement Equipme	ent Business
10	Ultrasonic flowmeters	Attached to the exterior of pipes, these devices use ultrasonic signals sensors to measure volumetric flow rate (the volume of fluid that passes per time unit) in the pipe. In 1963, we developed the world's first ultrasonic flowmeter for general industrial uses. Today, our clamp-on ultrasonic flowmeter is one of our top products. Unlike other models, the product can be installed and maintained without stopping the flow. Other ultrasonic flowmeters we offer include an ultrasonic Doppler for sewer pipes. Another is a device with parallel measuring paths which uses multiple ultrasonic sensors to achieve high- precision flowmetry.
11	Microwave level gauges	These devices measure fluid level based on the time it takes for microwave pulses to travel from the transmitter to the fluid surface and back again. The transmitter is mounted above the fluid surface to enable contactless measurement. Our latest high-frequency model uses a 26 GHz band to allow for a narrower beam. This design feature enables accurate measurement even in tanks that are small in diameter or that contain intricate devices such as agitators. For the disaster management market, we offer crisis-oriented microwave water-level- gauges for monitoring flood hazard level and a system that combines a water-level gauge with a level control device and a battery pack. Also for this market, we offer a hybrid floodwater level gauge that uses both microwave and pressure sensors to measure wastewater level during heavy downpours, mapping the full horizontal axis of the sewer pipe (from the bottom to the manhole).
12	Halon 1301 fire- extinguishing systems	Gas-based fire extinguishing systems are used in various applications, from large open spaces such as multistory parking garages to specific pieces of equipment such as printing machines. Among the different types of gas- based extinguishing systems, halogenated (Halon 1301) extinguishing systems offer advantages that include low volume of gas discharge that prevents suffocation, no polluting residue, and superior electrical insulating properties that make them safe for use around electronic devices. These features make these systems ideal for use in such areas as museums and electric rooms. Although Halon is considered to be an ideal fire extinguishing agent, as a CFC compound, production of new Halon ceased in January 1994. Use of the existing supply of Halon however is not prohibited and new Halon 1301 fire extinguishing systems have been approved for critical applications. The recycling and reuse of Halon 1301 is strictly controlled and through its website, the Fire and Disaster Management Agency encourages the recycling of Halon 1301 in order to prevent its release into the atmosphere by careless disposal and to preserve the environment.



	Term	Description
Defe	ense and Communicatio	ns Equipment Business
13	Radar warning receivers (countermeasure system, ESM system)	Radar warning receivers are incorporated in military and other aircraft to warn aircrews of threats from other aircraft, marine vessels and/or surface anti-aircraft systems by detecting the radio emissions transmitted by their radar systems. They improve aircraft survivability by notifying the aircrew of the type and direction of an enemy's radio waves, and whether there is a missile threat. The proprietary radar warning receivers as well as ESM (Electronic Support Measures) systems developed and provided by Tokyo Keiki can detect position as well as enable specific analysis of RF signals. The systems are mainly designed for aircraft such as fighters, helicopters and cargo aircraft.
14	Inertial navigation systems	Inertial navigation systems incorporate built-in sensors (Inertial Measurement Unit (IMU), etc.) to provide information such as on position and speed that are critical for the navigation of submarines, missiles and aircraft without dependence on any external signals.
15	Antenna directioning systems	When filming live from a helicopter, or when transmitting live broadcasts taken from moving vehicles to a helicopter in flight, clear transmission is only possible if the helicopter keeps its radio transmitter directed toward the ground station. This task is difficult as the helicopter constantly banks and changes position. Antenna directioning systems solve this problem. Using GPS, inertial sensors, accelerometers, and magnetic azimuth sensors, the systems keep track of the helicopter's location and attitude and adjust the antenna direction so that the transmitter always points precisely toward the ground station, ensuring stable transmission.
16	F-15 fighters	The F-15 J/DJ is a fighter aircraft based on the F-15 C/D, developed by McDonnell Douglas (now Boeing) and used by the US Air Force. The Japan Air Self-Defense Force (JASDF) has 213 F-15 J/DJs. The F-15 airframe was built in Japan by Japanese companies using US technology. We are one of the companies that produce equipment for the F- 15 J/DJ. Some of the equipment we produce is based on US technology. We also produce radar warning receivers in Japan using proprietary technology, as the US has not shared the technology for this. We make the radars ourselves, meaning that we can also modify and upgrade them ourselves. We have already released several iterations of modifications and upgrades. In addition, we have supplied some of the aircraft with ESM systems to enhance their capabilities.
17	Vessel traffic services (VTS) system	Vessel traffic services (VTS) are services implemented by a competent authority and are designed to improve the safety and efficiency of vessel traffic and protect the environment. In Japan VTS services are carried out by the Japan Coast Guard. VTS systems support VTS operators by providing situational awareness and communication and decision support tools including radar images that show vessel position and software that alerts VTS operators when dangerous maritime traffic situations are predicted from data analysis.



	Term	Description
18	Solid-state radars	Solid-state radars are the radars using solid-state devices inside the transmissions, which replace conventional magnetrons (electron tubes). As high voltage circuits are not used, these solid-state radars are smaller in size and radiate less spurious radio emissions compared with magnetron radars. With such advantages, they help address increasing social demands related to the maintenance and improvement of the environment and promotion of wireless communications. The solid-state radars provided to the Japan Coast Guard for VTS (Vessel Traffic Services) have significantly improved detection performance and resolution and boast excellent compliance with the increasingly stringent requirements pertaining to "Radio Regulations Concerning Permissible Values for Spurious Emission Intensity of Radio Equipment". We are developing monitoring systems for protecting critical maritime infrastructure such as oil storage bases. We are also marketing our SeaKu radar series globally.
19	SSPA	Solid-state power amplifiers (SSPA) are high power amplifiers that employ solid-state devices. SSPA's offer advantages such as high reliability and excellent linear characteristics compared with conventional electron tube (magnetron and TWT) amplifiers. They are used in microwave heaters and plasma generators for semiconductor production equipment, as well as in artificial satellites and various types of radars.
20	Straight line assistance for agricultural vehicles (AG-GEAR series)	The AG-GEAR series features automatic steering assistance devices for agricultural vehicles that use a global navigation satellite system (GNSS) to track the location of the vehicle and to steer it along a straight pre-set path. The device frees the driver from the need to constantly control the steering wheel, thus reducing the burden of working long hours on the farm. Stable forward motion is achieved with ease with the driver needing only to check the vehicle's status. An accelerometer and gyroscope correct fluctuations in acceleration and orientation, ensuring the vehicle is driven correctly even on inclines. Real-time kinematic (RTK) positioning is also available as an option. An RTK station installed next to the target field will correct GPS errors and maintain the vehicle on its forward path with greater precision.
Othe	ers	
21	Ultrasonic Flaw Detector	An ultrasonic flaw detector is a type of non-destructive inspection device that enables detection of defects inside of a target object by using ultrasonic technology. This device consists of pulse generator, probe, receiver and display. Ultrasonic waves are propagated into the target object and characteristics of the waves reflected from defects within the object are processed to enable determination of their location and size. This technology is employed by our group for rail maintenance in a variety of products such as rail inspection cars and portable flaw detectors.

