

COMMUNICATIONS

JRC's business in mobile communications equipment continued to expand in fiscal 2000 because a new i-mode cellular phone model and an Internet-based PHS terminal were put into the domestic market.

The delivery of the new i-mode cellular phone model R211i was started in March 2002 and 90K units were supplied to NTT DoCoMo. The i-mode outdoor type cellular phone model R691i that was jointly developed with NTT DoCoMo has been delivered since February 2001, and sale of more than 110K units are expected during fiscal 2002. The model R691i is designed to guarantee the JIS waterproof protection class 7 and it is also excellent in impact-resistance.

In the sale of PHS terminals, about 1,000K units have been sold since JRC launched the PHS business, which is expected to grow further. Now, JRC's newest models "JHP-920" (AJ-51) for Astel and "JHP-915/JHP-914" for export (mainly to China) are delivered to the domestic and overseas markets respectively. The prime sales point of both models is what we call "seamless hand-over" that allows very quick hand-over.

JRC is playing an important role in the business field of Mobile Communications Infrastructure such as base stations by supplying LPAs (Linear Power Amplifiers) in overseas countries as well as in Japan.

Along with the introduction of new cellular infrastructures for new wireless radio technologies so called 3G (3rd Generation Mobile Telecommunications) that provides high quality services to worldwide subscribers, JRC started commercial shipment of LPAs for 3G in the year 2000.

JRC's various LPA product lines up continuously responds the worldwide huge demand from the considerable market expansion in 2002 onwards.

The JRL-600SU wireless LAN for connection to a broadband network was released in December 2001. The antenna and the transceiver are combined as a single unit of compact and lightweight design, which is easy to install on any place such as the veranda of an apartment house. It has been difficult to introduce a wired broadband network to housing complexes and shopping and amusement quarters so far, but this equipment allows the last one-mile connections to those areas at a low cost, promising a remarkable broadband network expansion. In addition, the equipment installed at building rooftops and poles allows point-to-point communications over a distance of up to 2km, serving for the community information systems in municipalities. In 2002, the sale of about 10,000 sets is in prospect.

In order for Telecom Operators and Internet Service Providers (ISP) to provide the Fixed Wireless IP Access Service for the customers. JRC is developing the Fixed Wireless Access (FWA)



R211i



R691i



IMT-2000 MCPA

communications

System of 26 GHz band. Since the system is entirely new in terms of Frequency Band, Multiple Access Method, IP Traffic Management and so on, it is essential to verify the system performance in field and confirm the Validity of services to meet customer's requirements.

GPS receiver cores (CCA-450 series) especially integrated for car navigation systems in such way of factory-line-installation and user-installable options to the automobile industry and system integrators have been expanding its number of supply over one million units already in the fiscal year 2001.

Its next generation with smaller size and lower power consumption is scheduled to be introduced into the market by the middle of 2003, which is expected to call for another demand of application.

One of application of the GPS receiver core is GPSTAR (NNN-310TA), which has been in use with Personal Digital Assistants (PDA). Its standardized production has started early this year with a certificate of FCC in USA and switching function added of data output formats between JRC's and NMEA's responding to the needs in the markets.

Sales of GPS-based automatic vehicle management (AVM) systems to taxi firms, truck-transportation companies and other users were also favorable as in the previous year.

JRC has developed the JEM-400 and JEM-410A base station simulators and the JEM-411A communication tester, which are designed for compatibility with the W-CDMA system internationally standardized for high-speed data communications as one of the third-generation mobile communication systems. In addition to these, JRC has also developed a compact mobile phone tester ahead of the world. The new compact tester features the communication protocols for testing mobile phones and various testing functions including performance tests of RF characteristics, all of which are housed in a compact case. The operating unit is not contained in the case, but a standard personal computer (Windows2000) can be used for operation in consideration of the users' operating environment. This compact tester has a wide range of applications such as inspection of portable phone production lines and failure diagnosis at dealer and retailer shops. JRC plans to release this compact tester to the world market as well as in the domestic market keeping pace with the worldwide spread of the third generation of mobile communication systems.

Sales of radio and TV broadcasting and relay equipment for NHK and commercial broadcasting stations showed a slight increase over the previous year. JRC continues to develop terrestrial digital TV broadcasting equipment to meet the demand from the digital TV broadcasting services that are expected to start in 2003 in Japan.



26G FWA



CCA-450 and NNN-310



JRL-600 wireless LAN adapter/bridge and PCMCIA card type



JEM-411A

SYSTEM ELECTRONICS

The topics of JRC systems for the public sector in Japan and overseas projects during fiscal 2001 will be described below.

In domestic business, the landslide monitoring system for the Tone River Sabo Construction Office under the Ministry of Land, Infrastructure and Transport was completed in the mid-2001. This system employs a new technology of monitoring and measuring crustal movements with GPS (global positioning system) receivers. The system can be configured not only as an independent system but also integrated with a Sabo telemetry system to build an integrated Sabo monitoring system. Demand for this system from other areas throughout Japan is expected to continuously grow.

Under the “Cultural Information Network Development Project” by the Yamanashi Prefectural Office, the public cultural facilities that had independently been deployed across the Prefecture were integrated and networked with each another so that the art and cultural information can be disseminated through a centralized management for tied-up activities of those facilities. This system has realized the “Web computing system” for the first time in Japan.

Concentrated heavy rain hits many local areas across Japan in the rainy season in early summer and in the typhoon season in early autumn, causing large-scale disasters such as land slides and debris/mud flows that may involve many deaths and damages of houses. JRC's radar rain gauge has been playing an important role in the total anti-disaster information system. During fiscal 2001, JRC delivered a radar rain-gauge system to Ministry of Land, Infrastructure and Transport in Shikoku and Hokkaido. This radar-based system collects current and past rainfall data available from the information terminals installed at major base sites and presents future rainfall forecasts visually on the display windows.

Among overseas system projects, JRC received an order for a big project for Civil Aviation Authority of Singapore and Maritime and Port Authority of Singapore. JRC will install an HF communications system at Changi International Airport for ground-to-air communications with aircraft within the control area and the radio transmitters and receivers for the MF Navtex system at the maritime and port facilities for providing communications services and navigational and meteorological information to ships navigating in the vicinity of Singapore. The delivery of the CAAS/MPA system will be completed early in 2002.



Nikko Sabo Dam Supervising and Information System (Japan)



Komagatake Warning and Evacuation System (Japan)



Bili Bili Dam Telemetry System (Indonesia)

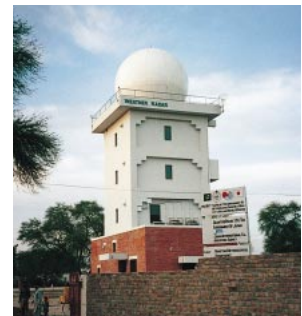
Indonesia is well known as one of the major volcanic countries and there are many volcanoes in Java, some of which are active. Especially, the Merapi volcano located in Jogjakarta at the center of Java has often erupted early in 2001. Whenever it erupted, evacuation recommendation to local residents was issued. The Ministry of Residential Area Development (former Ministry of Public Works) introduced JRC's "Mudflow Forecast and Warning System" under the Japanese loan to secure the residents' safety of life and improve administrative measures against debris and mudflow disasters.

The HF data communications system is configured as a voice and digital data communications network connecting the central station provided at the Manila airport via HF links to remote stations at local airports distributed in the Philippines. The equipment installed at each station incorporates an ALE (automatic link establishment) board to automatically select an optimum frequency and establish an HF link. The internal high-speed modem is capable of transmitting and receiving still images (black/white facsimile and color videos) and text data at the maximum transmission rate of 4800bps. The equipment at the central station can collect supervisory data from the equipment at local stations and control the equipment. No communication expenses are required because of the use of HF links, so that the communications cost is so low as the electric charges. The modem can also be used for various types of HF data communications. The communications cost is inexpensive in comparison with satellite communications cost. The HF data communications system is expected to find other applications such as the main link in a rural communications network in a developing country and in a telemetry communications network to gather information of a large, long river.

In addition, JRC delivered a GMDSS coast station system for the northern part of Vietnam under a Japanese loan for the first telecommunications infrastructure development project in Vietnam to a state-owned enterprise "Vietnam Ship Communications and Electricity Public Corporation" under the control of the Shipping Bureau of Vietnam. The coastal waters of this country are frequently stricken by typhoons. This system is expected to link via radio between the shore stations and the ships navigating in their vicinity in order to ensure safety of navigation, speedy and effective search and rescue operations in case of occurrences of sea accidents. JRC installed class 1 to class 4 radio stations at 11 sites in Vietnam.



HF Data Communications System Equipment



Meteorological Radar Site (Pakistan)



Vietnam Coastal Communication System Hai phong- Operation Center



Vietnam Coastal Communication System Hai phong- Transmitting

MARINE ELECTRONICS

JRC restructured its local subsidiaries and branch offices in overseas countries to reorganize its global network in fiscal 2001. Its marketing, sales, servicing and logistics storehouses were concentrated on three operation bases in Tokyo, Amsterdam and Seattle, aiming at establishing the effective marketing activities and the total maintenance system for a 24-hour quick service.

The Information Technology (IT) is not only a key to the land-use product business, but also very important for the marine electronics business. JRC is a world-leading marine electronics manufacturer making the most of the advanced IT in the marine communications and navigation equipment.

The JUE-310B Inmarsat-B HSD terminal capable of high-speed data transmissions at 64kbps is a key system for IT-based marine communications. The HSD function allows the reduction of communications cost in high-capacity data transmissions, the digital video and animated image transmission and the efficient operation of the fleet management system. JRC's Inmarsat-B is enjoying about the world share of about 30% and well accepted among the users. JRC has also launched the design of the latest Inmarsat system FLEET F77, which is the most advanced system using IP technology and digital packet technology for connection to networks and constant connection as well as system expandability.

In the navigation product line, the JMA-9800 series large color radar and the JAN-3598 large color ECDIS (Electronic Chart Display Information System) was put into the merchant ship market. The Integrated Bridge System (IBS) OceanExplorer and the Integrated Navigation System (INS), which integrated the above advanced navigation equipment, were also well accepted in the newbuilding market, winning a large market share. OceanExplorer is the Japan's first ANTS (Automatic Navigation and Track-keeping System) that acquired the type approval by DNV (Det Norske Veritas) in November 2001.



Inmarsat-B



IBS

marine elec
marine

Under the amendment to Chapter V of the SOLAS (International Convention for the Safety of Life at Sea), the ships in international voyage were obligated to carry the Automatic Identification System (AIS) and the Voyage Data Recorder (VDR) in and after July 2002. JRC launched the sale of the JHS-180 AIS and the JCY-100 VDR featuring high performance and perfect reliability to meet the demand from the world market.

Sale of the fishing and light marine products was in the almost same level as in the previous year because of the dull tendency in the catch of fish in Japan. In the European and U.S. market, the GPS 112W GPS receiver and the DGPS212W differential GPS receiver, which are designed to the standards WAAS in the U.S. and EGNOS in Europe, both calling for higher position accuracy, were put into the market. The sale of the RADAR1800 radar/plotter and FF50 fish finder/Plot 500F plotter packaged with the 6.5-inch LCD unit was also well received in Europe and in the U.S.

JRC launched the sale of the JLR-10 electronic compass system employing the GPS technology. This system is used as a maintenance-free backup compass for gyrocompasses and can enhance the functionality of ARPA (Automatic Radar Plotting Aid) system by connecting the compass to the radar.

JRC is an independent comprehensive manufacturer of marine electronics since its foundation in 1915 and has a full lineup of marine products supported by its worldwide sales and service network, making its best to contribute to the further development of the world shipping industry.



GPS Compass



Fish Finder-Plotter

electronics
electronics

NEW JRC

New Japan Radio Co., Ltd.

New Japan Radio Co., Ltd. (New JRC) is a semiconductor manufacturer having 8 consolidated subsidiaries (one added to those in the previous year) and manufactures and sell electronic parts (microwave tubes, computer peripheral equipment, microwave devices and semiconductor devices). In April 2001, NJR Service Co., Ltd. was started up to undertake contract-based manufacture of various products and indirect work services.

During the term under review, New JRC was forced to make substantial production adjustment in its main product line of semiconductor devices, while its microwave device business was hard to grow because the information technology field in the U.S. market was extremely sluggish.

As a result, total sales amounted to ¥49,437 million on a consolidated basis, a decrease of 23.8% below the previous year. Ordinary profit decreased 81.8% below the previous year, to ¥1,279 million and net income amounted to ¥654 million, a decrease of 73.3%.

Consolidated Business Performance

	Millions of Yen		
	2002	2001	Growth Rate
Sales	49,437	64,842	23.8%
Operating income	1,222	7,154	82.9%
Ordinary profit	1,279	7,013	81.8%
Net income	654	2,454	73.3%

The business outline by product segment in fiscal 2001 will be described.

• **Microwave Tubes and Peripheral Equipment**

Business of electron tubes and peripheral equipment for the private sector was dull due to the sluggish market for marine radar products and economic recession, while the business for the public sector showed a favorable growth and an increase in sales above the previous year because inventory adjustment by major customers completed.

As a result, total sales in this product segment amounted to ¥4,567 million, an increase of 8.7% and operating income amounted to ¥593 million, an increase of 69.6% above the previous year.

• **Microwave Devices**

Sales of components for satellite broadcasting equipment decreased due to inventory adjustment affected by the sluggish U.S. market, while sales of components for satellite communications equipment decreased due to slowing demand from major specific customers. Sales of components for terrestrial communications equipment decreased due to inventory adjustment affected by the sluggish European market.

As a result, total sales in this product segment decreased 56.9% below the previous year, to ¥3,369 million. Operating income amounted to ¥228 million, a decrease of 39.1% below the previous year.

• Semiconductor Products

Bipolar product business was dull during the term under review because the market was scaled down through long-term inventory adjustment affected by slowing demand for AV equipment, Personal computers and peripheral equipment as well as for cellular phones, scaling down the market.

Sales of MOS products decreased because sales of crystal oscillator ICS and OEM products decreased though demand for color LCDs and surround ICs increased owing to active marketing efforts.

Semiconductor device business was also dull because demand for GaAs ICs from major customers in the cellular phone industry remained slow. Also, sales of optical semiconductor devices decreased mainly for commercial appliances.

As a result, total sales in the semiconductor segment decreased 21.4% to ¥41,499 million, and operating income amounted to ¥5,488 million, a sharp decrease of 50.2%.

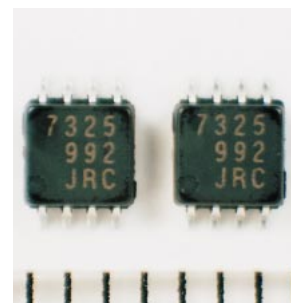
R&D Activities

The R&D efforts of the New JRC group ranges from planning and design to production technology of semiconductor products as key devices of electronic equipment and microwave devices for radar, satellite broadcasting and communications and terrestrial communications.

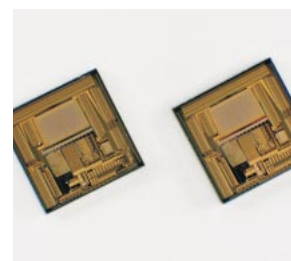
In the year under review, New JRC launched the developments of an electron tube and components for radar, microwave devices and SiC devices. In addition, the developments of the next-generation model of the 20GHz LNB (low noise breaker) for satellite broadcasting and communications and an inexpensive model and a lineup of general-purpose models of the ODU (outdoor unit) for satellite communications were also started. A 26GHz-band FWA (fixed wireless access) product and a high-speed, wide-band operational amplifier with a low current drain have also been developed. The full swing operational amplifier has been designed for a low current drain, low voltage operation and a high output current.

The R&D expenditure amounted to ¥5,541 million, which was appropriated to the following developments:

- A lineup of low saturation type regulator power supply ICs ranging from compact type, thin type to complex type was strengthened to meet diverse market demand including cellular phones.
- A number of audio processor ICs for TV combining electronic volume and tone control with various types surround functions was developed and a lineup of 3V operation video amplifier ICs intended for digital cameras was strengthened and launched into market.
- In the DC motor IC field, the fan motor ICs for PC and OA equipment and the 60V withstand voltage products have been developed and put into the 48V-line market for cellular phone base stations and network servers.



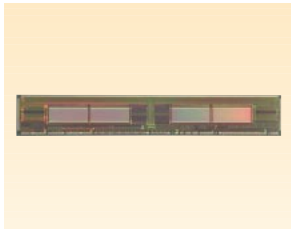
NJU7325



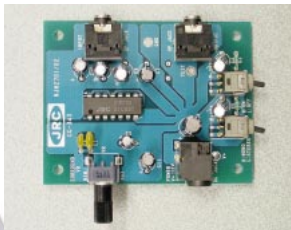
NJU6678



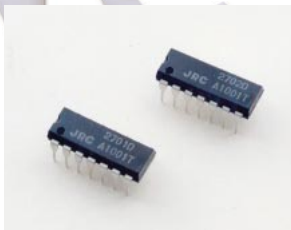
NJU6821



NJU6825



NJM2701P



NJM2701

- For the LCD drivers for the cellular phone market, a one-chip narrow-pitch STN color driver with 4,096 colors was developed and launched into the market. A lineup of digital amplifiers with excellent power conversion efficiency was arranged, in which a one-chip digital amplifier to convert digital audio signals into amplified analog signals and a class-D switching buffer to convert DSP output signals into analog signals in a simple way were developed. In addition, the 620MHz output for crystal oscillation with a low jitter was realized for optical communications, aiming at its early product development.

- In the GaAs IC field, a dual-mode IC for the RF unit for cellular phones and a low noise amplifier, mixer and an antenna switch as well as a number of ICs integrating these components were developed. For the optical use, a high-speed photo diode in a small package was developed for production unique to NJRC.

New Products

Some of the new products developed in fiscal 2001 will be introduced:

1. The development of large liquid crystal displays is actively made to browse i-mode and Web information in the current boom of portable phones. Portable phone manufacturers are now under competition for the development of the portable phones capable of color photo display.

New JRC has developed two types of color LCD driver IC (NJU6821/25) to keep pace with this development trend.

The NJU6821 IC is capable of displaying 82 x 128 dots in 256 colors, up to two ICs being connectable to display 164 x 128 dots. The NJU6825 is capable of displaying 162 x 128 dots in 4096 colors. Both products can support the partial display function to display necessary display blocks in the standby mode of a portable phone and the X-Y address function to momentarily rewrite part of the contents on display. Both ICs operate on the power supply voltage of 1.7 to 3.3V, ensuring a low current drain in conjunction with the partial display function and contributing to extended standby time for portable phones.

2. The surround audio processors NJM2701 and NJM2702 were developed using NJRC's original technology without relying on any licensed technology, which incorporate a simple circuitry to realize natural surround effects that do not make listeners feel tired in long-time listening. Trial listening was repeated many times until the circuitry was finally designed and the excellent products were completed, which can be introduced to customers with confidence could be completed.

The NJM2701 and the NJM2702 can reproduce a natural stereophonic field with high clarity from a monaural source and from a stereophonic source respectively.

These products have a unique product name "eala", which is a word combining "ear" in English with "ala" in Spanish to appeal their good performance and image a comfortable sonic space like the dome of the sky in which sounds resonate.

ALOKA

Aloka Co., Ltd.

Aloka Co., Ltd. is a leading medical electronics manufacturer having 12 consolidated subsidiaries (one added to those in the previous year). Its main product lines are electronic medical systems, radiation protection and analytical instruments, and clinical laboratory systems. In May 2001, Aloka Enterprise Co., Ltd. that is engaged in distribution management was renamed AEC Co., Ltd. In October 2001, Aloka System Engineering Co., Ltd. was started up to undertake software development.

In the year under review, Aloka made efforts for new product development, cost reduction, strengthening of marketing capability, quality and environmental system establishment, and improvement of general management efficiency through fixed cost control.

As a result, total sales amounted to ¥46.2 billion, an increase of 5.7% above the previous year. Ordinary profit decreased 8.9% below the previous year to ¥3,083 million due to decline of selling prices under intensified competition and sluggish stock market despite cost reduction efforts. However, net income amounted to ¥1,499 million, a slight increase of 0.7% above the previous year.

Consolidated Business Performance

	Millions of Yen		
	2002	2001	Growth Rate
Sales	46,200	43,720	5.7%
Operating income	2,843	3,246	12.4%
Ordinary profit	3,083	3,385	8.9%
Net income	1,499	1,488	0.7%



ALOKA Survey Meter

The business outline by segment in fiscal 2001 will be described.

• Electronic Medical Systems

The domestic demand for diagnostic ultrasound systems that are main products in this segment is decreasing because the reform of medical treatment fee reduction is promoted, resulting in decrease in equipment investment in medical institutions. Although the oligopolistic system was established through M&A, the competition among products including imported systems became severer. The medical environment had no bright prospect, but Aloka launched new products using edge technology into the market and promoted its active marketing strategy.

The new products put into the market were provided with wealthy applications based on high image quality, realizing advanced system configurations. As a result, these products marked a favorable growth with high reception in the medical field.

Aloka

Among other products, the bone densitometry system and the bone analysis system applying ultrasound technology showed a steady growth. In the domestic market, however, a hard fight was forced due to the intensified competition and the longer renewal period of these systems.

In the overseas market, sales increased more than expected owing to expansion of the marketing network and the tendency of low yen rate.

As a result, total sales in this segment showed an increase of 15.9% above the previous year, amounting to ¥35.1 billion.

• Radiation Protection and Analytical Instruments

In the products including radiation measuring instruments and radiation monitoring systems, sales of facilities monitors and model-changed survey meters increased because of increase in hospitals in which nuclear medical diagnostic systems and cyclotrons were installed. However, the nuclear power prevention and safety measures that had been promoted for the past 2 years against emergency cases were completed and the entire market entered the between period and changed into the severe environment.

On the other hand, the bio-business team was organized in 2001 because the research into genetic information became active in the biotechnology field. Further, a genetic research center was established in Tukuba district in order to actively promote the business for diagnostic systems in the future age of tailor-made medical care.

As a result, total sales in this segment amounted to ¥7,668 million, a decrease of 18.8% below the previous year.

• Clinical Laboratory Systems

The medical institutions and clinical testing centers that were main users of the specimen testing system and the pipetting system suffered a continuous downturn in revenues due to continuous revision of medical treatment fees. In these circumstances, however, the needs for the automated specimen preparation system have been growing in the specimen testing industry because of its accuracy control of test data, high-speed processing and energy saving. This system is also in a good position because the use of the specimen ordering system (using bar codes) has been accelerated to prevent the medical mistakes in the medical institutions. The clinical testing center industry made a large investment in equipment to survive the downturn of revenues. Aloka's products integrating the most advanced mechatronics with wealthy software received high evaluation and increased sales.



ALOKA SSD-4000

ALO

However, total sales in this segment decreased 14.1% below the previous year to ¥3,430 million due to decrease in OEM business with large customers.

R&D Activities

The research and development of Aloka group is categorized into the research into elementary technology and the technical development directly connected with product development made by the engineering departments.

The R&D activities in fiscal 2001 focused on the advanced technologies in the medical, radiation and bioelectronics and development of high-performance products with high safety to meet the needs of customers.

The total R&D expenditure in the year under review amounted to ¥5,048 million, which was appropriated to the following activities:

- The products such as various types of diagnostic ultrasound systems and transducers were developed and engineered.
- High-resolution diagnostic ultrasound system for bodies and blood vessels were developed and engineered.
- An ultrasound bone analysis system for early finding and diagnosis of osteoporosis was developed and engineered.
- Various types of radiation measuring instruments and monitoring systems were developed and engineered for nuclear facilities including nuclear power plants, and universities, hospitals and research institutes using radioisotopes.
- Genome analysis equipment was developed for biotechnological researches in universities and research institutes.
- Automated specimen preparation systems and testing systems were developed and engineered for centrifugal separation, valving and pipetting of specimen such as serums at hospitals and clinical testing centers.

New Products

Some of new products developed by Aloka in the year under review will be introduced:

- **Automated specimen preparation and pipetting system**

Specimens are precious information sources available from patients. The specimen preparation process occupies 30% of the specimen testing work and it is made manually, taking much time. To simply operate this specimen preparation process, the LabFLEX2500 automated specimen preparation and pipetting system was developed.



LabFLEX2500

This system is designed to integrate the processes from valve opening to pipetting and sub-specimen labeling. It features compact design for space saving and superior cost performance to best match with the needs from testing laboratories, succeeding the features and functions of the APS-3000 automated specimen preparation system.

The automated system ensures that the minimum specimen quantity necessary for analysis is effectively used and that the margin of time available in checking of analyzed results is used for feedback of the reliable test results to the clinical side.

• **Automatic in-situ hybridization system**

The in-situ hybridization system is a means of researching into the functions of in-vivo genes in the cell level, which provides important information in researches and tests. A series of processes including hybridization, antigenic and antibody reactions, and oxygen reaction are simple, but should be handled accurately, and these processes require a long time totally.

The GENEMASTER ISH series automatic ISH system was developed to support the processing of many genes and samples for effective use of precious research hours.

The GENEMASTER ISH series can prepare protocols flexibly by selecting the parameters such as processing time, reactive temperature and stirring speed, and control reagents at adequate temperatures, ensuring full-automatic in-situ hybridization.



ISH

Aloka
Aloka