Even since the company was founded, “Safety” has been ranked as the top priority item for management, and all employees of the company have been making a unified effort to create a reliable railway system that will win the confidence of passengers. As a result, the number of railway operating accidents has been reduced to less than 40 percent what it was immediately after the company was founded. We are now committed to further improvement of safety based on the “New Frontier 21” as a medium-term business plan of the JR East group.

To improve the “Safety” of the entire JR East group, it is important for each organization to take a positive stance in achieving safety. Based on the recognition that safety is created by independent individuals and organizations, we are aiming at creating the climate where “safety” is improved by each employee of each member company of the group at his or her own responsibility.

2. Creating a climate for safety (toward improvement of the safety-oriented consciousness of each employee)

2.1 Creating a climate for discussing safety

JR East is committed to safety measures where voluntary and independent efforts by each employee are highly appreciated. Specific examples of these activities include a “CS campaign” (Challenge/Safety movement) where each employee is required to contribute to safety in his or her working environment, a “Safety Caravan” where the management people of the head office visit the fields of each branch office every year, a “Safety Symposium” where safety is discussed from a broader perspective, and a “Safety Forum” held in each branch office. These activities are held every year.

In November 2002, “International Railway Safety Conference” was held in Tokyo. This was the 12th conference, which was attended by 66 people from 20 countries and regions -- a total of 520 people including the participants from Japan -- to discuss railway and safety.

2.2 “Safety” as learnt from past accidents

Sixteen years have passed since the foundation of JR. In the current situation where systematization and alternation of generations take place, it is important to make effective use of the lessons learnt from past accidents, and to teach the essentials of safety to the employees engaged in the railway business and employees working for the group companies. To assist in this undertaking, a “Hall for chronological exhibition of accidents” was established in the JR East General Education Center located in Shirakawa City, Fukushima Prefecture on November 1, 2002. In fiscal 2002, about 2300 people...
received education and training in order to raise the safety consciousness of the employees.

2.3 Study on human factor
To keep pace with the progress of technology, we made various systematization efforts. In recent years, however, more attention has been paid to human-induced errors that cannot be corrected by the system. In our Safety Research Laboratory, we have continued to make efforts for further studies of human factors.

3 Improvement of safety equipment

3.1 Measures against train collisions
In response to the Mikawashima Accident on the Joban Line, Model ATS-S, an automatic train stop device, had been installed on all the lines of the Japanese National Railways. Then ATS-P was introduced on the Keiyo Line in December 1988. It is provided with a speed check function and is characterized by a higher degree of safety than the ATS-S. Since that time, this device has been installed on the main
line section in the Tokyo area.

In the fourth term construction program for fiscal 2001, use of this device was extended on the Tohoku Line (from Koganei to Utsunomiya), Joban Line (from Tsuchiura to Katsuta), Chuo Line (from Otsuki to Kofu), Tokaido Line (from Odawara to Kinomiya), Sagami Line (from Chigasaki to Hashimoto) and Hachiko Line (from Hachioji to Komagawa). In the fifth term construction program for fiscal 2002, use of the device was further extended on the Joetsu Line (from Shin-maebashi to Shibukawa) and Ryoumou Line (from Shin-maebashi to Maebashi). In the construction program for fiscal 2002, use of the device was further extended on the Joetsu Line (from Shin-maebashi to Shibukawa) and Ryoumou Line (from Shin-maebashi to Maebashi). Currently, the construction program is also being implemented to introduce this device on other line sections. Upon completion of this program, the device will have been introduced on the section extending about 1,800 km in and around the Tokyo area (100 kilometers).

In the sections where ATS-P had not been introduced, ATS-SN has been in use since November 1989 for improved operating safety, whereby the emergency brake is applied immediately before the train comes to a stop signal. Installation of this device was completed for all line sections by 1992.

ATS-Ps was introduced into on the Senzan Line (from Sendai to Ayashi) in December 2001. To increase the safety further, this system has a function added to the ATS-SN, and an independent brake pattern for each frequency is produced to check the train speed. This was followed by the introduction of this system into the Tohoku Line (from Shin-ishi to Iwanuma), Echigo Line (from Niigata to Uchino), Senseki Line (from Aobadori to Higashi Shiogama). In the future, this system will be extended in the Sendai and Niigata areas.

We are implementing a plan of installing a digital ATC totally different from the conventional ATC. In this system, the position of a preceding train is sent by digital signal from a ground-based station, and the optimum brake control is implemented on board the car with consideration given to the track conditions such as a curvature or slope. Introduction of this digital ATC system improves the riding comfort of the passenger and provides assistance to the train operator by reporting the position of a preceding train. This ensures more smooth and effective operations.

The digital ATC is currently employed on the Tohoku Shinkansen (from Morioka to Hachinohe) that started commercial operations on December 1, 2002. For the narrow gauge lines, the system will be introduced into the Kehin Tohoku Line in fiscal 2003 and into the Yamanote Line in fiscal 2005.

3.2 Ensuring safety during maintenance work

Maintenance has to be carried out close to the tracks. This makes it
very important to ensure safety of the maintenance personnel. It is also important to prevent collisions between trains and maintenance cars because of the growing size of the maintenance car. For this purpose, we are making efforts to create a working environment capable of achieving the target of "separation between train operation and maintenance work."

3.2.1 Promoting systematization of the track possession procedure

At the start or termination of track blocking work, complicated procedures including communications among maintenance personnel and train dispatcher/station employee are necessary. To reduce the workload of the maintenance personnel and train dispatcher by simplifying this complicated procedure, we are promoting systematization of the track clocking procedure.

At present, ATOS (Autonomous Decentralized Transport Operation Control System) as an operation management system for high-density operating sections is in use in the major line sections of the Tokyo area. In this system, the operator uses a handy terminal to specify the work area, thereby preventing trains from entering the maintenance area and ensuring the operator safety.

For the local main lines, we are studying the use of a local main line maintenance work management system where such operation as checking the train intervals for maintenance work, control of related signals and maintenance car course control are systematized similarly to the ATOS. At the same time, in this system, a handy terminal will be used by the maintenance personnel and train dispatcher/station employee in the case of work application or approval to start and terminate work. On the local line sections, we are testing the use of a track blocking procedure support system and train operating status checking system that allows the start and termination of work and train operating status to be identified via a mobile terminal without a station employee, where a certain restriction is imposed on the scope of systematization.

3.2.2 TC type radio train approach warning system

When tracks are patrolled and inspected to maintain such facilities as tracks and train lines, prevention of collisions between the maintenance personnel and trains depends solely on the attention of the train watcher.

As a backup system, we have developed a TC type radio train approach warning system that provides the maintenance personnel with information on approaching trains by radio using the existing wayside telephone lines. It has already been installed in a section that comprises about 5,200 km (railway route length).
This system is so configured that it can be operated by a passenger on the platform as well as by the station employee. An indicator plate showing the switch position is installed at a clearly visible position, and the columns with switches can be easily distinguished from those without them. The train emergency stop warning systems will be installed at about 350 stations in and around the Tokyo Metropolitan area by fiscal 2002. Further, a platform campaign has been carried out every year since fiscal 1999. It will be continued in the future to get passengers’ understanding and cooperation.

3.4 Prevention of level crossing accidents

3.4.1 Installation and expansion of crossing obstruction detectors

A collision between a train and an automobile (especially a large-sized automobile) at the level crossing may lead to death and injuries of many passengers and a driver on the train. To prevent such accidents, we are installing crossing obstruction detectors. When an automobile has been brought to a standstill, this device automatically detects it and informs the train driver of the situation. These devices have been installed at about 2,400 crossings by the end of fiscal 2002.

3.4.2 Improvement of level crossing control force

There has been a remarkable decrease in the number of crossing accidents compared to the level just after the foundation of the company due to crossing-accident prevention measures. However, about 60 percent of the accidents are caused by unreasonably passing through the crossing immediately before a train is coming. This makes it necessary to take effective measures conforming to the characteristics of each crossing.

To improve the visibility of the crossing, we use a large-diameter crossing rod having a diameter twice as large as that of the normal one. Alternatively, we use a two-stage crossing rod that can be easily identified from the high driver seat of a large-sized automobile. In this crossing rod, another crossing rod is installed at a higher level in addition to the normal barrier.

To get the understanding and cooperation of passengers and car drivers, we will continue to promote a campaign to prevent crossing accidents.

3.5 Innovation of train operating system

3.5.1 Installation and expansion of ATOS

ATOS (metropolitan area transportation management system) is an acronym for Autonomous decentralized Transport Operation control System. Using state-of-the-art computer technology and information technology, this system has been designed to ensure train operation management meeting the requirements of the next-generation railway. In addition to the conventional PRC function, it has a function for automatically controlling the guidance system of the station based on the train scheduling data. This allows information to be given to the passengers in a timely manner when a train schedule has been changed. Further, when maintenance work is performed, the maintenance personnel handle the work terminal directly without using a station employee or a dispatcher. This permits starting and terminating track blocking, and changing of the switch, thereby improving maintenance safety.

This system has been used on the Chuo Line (from Tokyo to Kofu) since December 1996. Now it has been introduced into the Yamanote Line, Keihin-Tohoku Line, Negishi Line, Sobu Local Line, Sobu Express Line, Yokosuka Line, Tokaido Line, and Tokaido Freight Line. It will be introduced into major sections in and around the Tokyo area, including the Joban Line and Tohoku Line.
3.5.2 Promoting the use of CTC and PRC
CTC (centralized traffic control) is the result of evolution of a system capable of remotely controlling the signals and switches installed at stations. It allows train operating information of an entire section of a line to be centrally displayed at the control station where control is carried out. Further, PRC (Programmed Route Control) is the result of evolution of the conventional CTC where the train dispatcher determines train routes. It allows the computer to memorize the data required for route control at each station for the train to be operated, whereby the train's route is automatically controlled.

We have been making a steadfast effort to promote adoption of CTC and PRC in sections other than the Tokyo area. The current distance of sections where CTC is installed is about 5,500 km. Of this distance, about 4,700 km uses PRC.

3.5.3 Shinkansen operation management system
Since 1995, COSMOS (Computer Oriented System for Management Order Synthesis: New Shinkansen Total System) has been in use, instead of the operation management system that had been used since commencement of the Shinkansen operation. COSMOS uses a network to integrate the subsystems for individual jobs according to the commands for transportation program, operation management, car management, car depot, and facilities, thereby ensuring sharing of information and linkage among jobs. It is characterized by (1) modernization of station and maintenance work, (2) meeting new transportation needs, and (3) improving functionality of the command services.

3.5.4 Improvement of train radio system
The train radio system is available in three types. Type A train radio equipment (duplex operating system) is used in high-density sections of large cities where quick transmission of a large amount of information is required, and in Shinkansen direct lines that have great train missions. Type B train radio system (semi-duplex operating system) is used in sections having a great number of train runs and especially great train missions except for Shinkansen. Type C train radio system (simplex operating system) is used in other line sections. Our train radio system covers a distance of about 5,800 km, of which the distance of about 2,500 km in and around the metropolitan area is covered by Types A and B.

Further, the digital train radio system was adopted between Morioka and Hachinohe on the Tohoku Shinkansen on December 1, 2002, which was opened for operation on the same date. In the coming years, the train radio systems on the Tohoku and Joetsu Shinkansen will be changed into digital systems one after another.

4 Conclusion

To fulfill the social mission of the JR East Group with growing importance in the future and to meet the ever growing level of passenger expectation, it is important to create a “world’s number-one railway system” of greater safety, thereby improving the train service quality. We will make ceaseless efforts for innovation, always keeping in mind what contribution can be made by each group member in order to completely fulfill the various targets of the “New Frontier 21.” All members of the Group will make a concerted effort toward concrete implementation of “Safety Plan 21” as a guide to ensure safety for the 21st century; namely, toward achieving the target of “No injury to passengers & No fatality to employees”.