**Fig.2-1:** The release of the JNR C50 steam locomotive, the second time this model has been revised and released since its first production by Sekisui Kinzoku in 1965, celebrates the 50th anniversary of Sekisui Kinzoku and Kato in the N-gauge market. A DVD and booklet summarizing the development of Sekisui Kinzoku throughout the last five decades are included in a specially designed collector's box. The color and design of the paper included in the plastic case for the C50 were selected to imitate the same design of the box used for the earliest Kato N-gauge products.

**Fig.2-2**: Developments in the structure and the reproduction of details during the last 50 years are clearly visible by the comparison of the latest model with the first. It is noteworthy that the proportions of the first model locomotive are still praiseworthy.

**Fig.2-3**: The design of the 50th anniversary model of the C50 is based off of the original prototype of JNR C50, which is characterized by the chimney shape, the smaller headlight, the number plates with the description of the locomotive, and the style of brake hoses.

**Fig.2-4**: To reproduce the look of the locomotive from when it was freshly built, the model has been given a glossy finish. This glossy paint finish is unique to the 50th anniversary model.

**Fig.2-5**: In the latest model, almost all of the rods around the drive wheels and cylinders are composed of moving parts.

**Fig.2-6**: Great effort was made to reduce the distance between the engine and tender, and to reproduce the pipework in great detail on this 50th anniversary model.

**Fig.2-7**: For years, small steam locomotives belonged to a category of prototypes of which manufacturers found difficult to create precise models. Through the development of new fabrication technologies and the introduction of the coreless motor, the JNR C12 was produced true to scale with high-performance operation, traction, and detailed precision. The model of the C12, released in 2014, proudly displays the development of technology during the past five decades.

**Fig.2-8**: With a fully detailed cab interior for this small steam locomotive (only 80mm in length), the result is an extremely compact and condensed body, whose realism and presence are equal to those of larger locomotives. The use of fine detail parts and carefully applied paint details help make this small locomotive attractive.

**Fig.2-9**: Poor electrical pickup is always a hurdle for smooth operation, especially for small locomotives. To combat this, a new design for the leading and trailing wheels was developed for the C12 model. In the existing design, inner spokes were made of insulating plastic, while the metal wheel and spokes are machined as a unit in this new design. The entire wheel is coated with a matte surface finish, cf., Sections 6.5&6.6 in Chapter 6.

**Fig.2-10**: The back of a tank engine locomotive often becomes the head of the train in local lines without a turntable. A ladder and an uncoupling lever around the coal banker are reproduced as separate parts. Individual snowplow parts are included with the locomotive and are easily attached if needed.

**Fig.2-11**: The JNR C59 steam locomotive's original release as an N-gauge model was announced in the catalog around 40 years ago. The traction to pull 15 coaches is made possible by the latest design of the model's weight distribution throughout the body of the engine. The new model meets the requirements for the express night train "Aki," composed of 10 coaches, a famous train pulled by the C59 in the last era of active steam locomotives of Japan. The model of the C59, which was released in 2015 and included the specifications of today's N-gauge steam locomotives while reflecting all of the latest manufacturing technology, can be regarded as an alternative model celebrating the 50th anniversary.

**Fig.2-12**: The JNR C59, characterized by its long engine and the longest tender manufactured for long distance operation, attracts many rail enthusiasts in Japan despite its lesser power compared to C62 as the largest JNR steam locomotive.

**Fig.2-13**: A front-view of the C59 confirms its well-balanced proportions.

**Fig.2-14**: The C59 has a closed cab in the shape of a retracting angle. Because of the long boiler, the overhang of the cab above the trailing wheel is pushed back. The tender for the postwar style C59 has the shape of a tapered bottom without the frame, from which a realistic ATS (Automatic Train Stop) detector hangs on the model.

**Fig.2-15**: Today, KATO often releases models of specific trains, including all component cars as a train set. In the last active period of the C59 it pulled express sleeper trains, "Aki," on the Kure line along the Seto Inland Sea near Hiroshima. "Aki" is composed of 10 Series passenger cars. The models, with a term of "1967," include coaches with three-axle bogie trucks, a diner car "MASHI35," and a baggage car "KANI38."

**Fig.2-16:** The JNR D51, often called by its nickname "Degoichi," is a steam locomotive that operated in all regions of Japan. As many as 1,115 D51 locomotives were produced starting in 1936. They included many variations in styles, along with equipment variations that were necessary depending on each individual line.

**Fig.2-17:** The standard style D51 for the Tohoku area, located in the northern part of Honshu island, operated in Jyusanbongi Hill where three D51 locomotives heading a heavy freight train was common until 1968. The D51 is characterized by a large heavy oil tank located on the tender and an additional smaller headlight adjacent to the main light.

**Fig.2-18:** This D51, used in Hokkaido Island, has a closed cab and modified smoke deflectors in which the front of the deflector was cut. There is another variation in the D51 Hokkaido style model which has a flattened chimney, referred to as the "Giesl ejector," which was developed in Europe.

**Fig.2-19**: The primary style of the D51 has a streamlined cover for the steam reservoir and a sand box on the boiler, called "Namekuji," which translates to "slug." It also has a round-shaped front boiler cover around the perimeter of the smoke doors and casted trucks for the tender.

**Fig.2-20:** Variations of the D51 are clearly recognizable by comparing these precisely-reproduced models of different prototypes. This is just one of the many ways to enjoy model railroading!

**Fig.2-21**: The old direct-current electric locomotives before the development of high-performance motor and driving mechanisms are classified into passenger train locomotives, with prototype numbers from 50-59. Locomotives used for freight service included prototype numbers from 10-19 where the reduction gear ratio is varied and a part of the former locomotive has a steam generator for heating passenger cars. The picture shows an EF56's primary body style, EF57 1 and EF57 2- from right to left. The leading trucks of the EF56 are located inside of the frame.

**Fig.2-22**: On the right, an EF10 locomotive for freight train service is added. This locomotive has a leading one-axle wheel set for each front truck and the length of the decks is shorter than those of other locomotives used for passenger service. There are variations in the position of pantographs, where the distance of the two pantographs is enlarged for the EF57 2- to reduce the concern of them interacting with a catenary.

**Fig.2-23**: The prototype of the EF10 tertiary style has a stainless steel body, perfect for operation in the Kanmon tunnel that connects the islands of Honshu and Kyushu and where sea water leaks are unavoidable. The EF10 originally had an unpainted silver body and pulled both passenger and freight trains through the tunnel. The model reproduces the last style of the locomotive operating along the Iida line.

**Fig.2-24**: The primary body style of the EF56 is similar to that of EF10 tertiary style, while the role and specifications required for the locomotive are similar to those of the EF57. This model represents the style of the last years of the locomotive when it pulled baggage trains. A train set of baggage coaches are also available.

**Fig.2-25**: The universal dual-current locomotive JR EF510 is very popular. It pulls the limited express sleeper trains "Hokutosei," the Big Dipper, and the "Cassiopeia," whose routine runs recently retired. Three models are available. The picture shows, from right to left, the EF510 500 in Cassiopeia color, the EF510 500 in Hokutosei color, and the EF510 0 in the color red for freight trains.

**Fig.2-26**: The circular head signs are included on the EF510 500 models for the "Hokutosei" and "Cassiopeia."

**Fig.2-27**: The illustration of a falling star on the sides of the locomotive is beautifully reproduced.

**Fig.2-28**: "Usui" hill, with a 66.7‰ maximum grade, is located between the Yokogawa and Karuizawa stations on the Shinetsu line. The direct current locomotive JNR ED42, which operated on the rack rail of the Abt system, was replaced by the DC locomotives JNR EF62 and EF63 in 1963 when a new line was constructed which did not depend on the rack system.

**Fig.2-29**: The EF62 is operated at the head of the train as the primary locomotive which pulls the train along the entire route, including Usui hill. The model reproduces the three-axle trucks for the new-type electric locomotives, a FRP (Fiber Reinforced Plastics) cover on the roof, and base plates on the pantograph with a distinctive appearance.

**Fig.2-30**: For passenger and freight trains, a combination of EF62 and a pair of EF63s were observed on Usui hill. A pair of EF63s were connected at the end of train to help the train up the hill. Three locomotives were added when the train goes down the hill.

**Fig.2-31**: The EF63 is operated only on Usui hill as an auxiliary locomotive. A pair of EF63s assisted a wide variety of trains, including electric and diesel locomotives to climb the hill safely. The EF63 has couplers of multiple shapes and jumper lines to be connected with any train. Such distinct details are fully featured in the model.

**Fig.2-32**: "Itaya" Hill is one of more famous hills in Japan; with a 33‰ maximum grade, it is located between Fukushima and Yonezawa on the Ouu line in the Tohoku area. After DC electrification, the line was electrified again by using alternative-current. Today, "Shinkansen" trains pass though the hill.

**Fig.2-33**: Alternative-current locomotive JNR EF78 played an active role on the Itaya Hill. The EF78 has four driving axles and additional two axles with a variable axle load mechanism controlled actively via air suspension, which allows the locomotive to operate on other lines such as the "Senzan" and "Banetsu-Sai" lines.

**Fig.2-34**: The JNR EF71 is the second alternative-current class F locomotive which utilizes six driving axles, following the EF70. The EF71 was developed to ensure sufficient traction power and brake force for the

electrification of the "Tohoku" line and the Ouu line by alternative-current.

**Fig.2-35**: A front view of the ED78 and EF71. They are almost identical, but one difference is in the bolts for protectors, a feature precisely replicated in the models.

**Fig.2-36**: Among the alternate-current electric locomotives, where most of them are of a Class D type with four driving axles, the EF78 and EF71 coupled together showed great power along the rails.

**Fig.2-37**: Recently, a concentration on one railroad line with distinctive characteristics was started. A series of nostalgic Iida line locomotives were born under such background. On the Iida line, various types of old direct-current electric cars gathered from all regions of Japan, often called the "Museum of old JNR electric cars." Furthermore, many scenic spots from hometown villages are located along this line. The picture shows a front view of the JNR old-type electric cars from the 1970's and 1980's. The shape of the bodies, including their faces, are different, each reflecting their individual origin, intended application, manufacturing date, and specific modification.

**Fig.2-38**: An exceptionally popular electric car on Iida line is the KUMOHA52 with a streamlined front. This model reproduces the front style of body and the shape of operating tail lights.

**Fig.2-39**: The KUMOHA53, whose side view is similar to the KUMHA52, is second-most popular, and one variation model of the KUMOHA53 007 was released in 2013 as one of the first items produced for the Iida line series by KATO.

**Fig.2-40**: An alternative variation of the KUMOHA53 is the KUMOHA53 008, which has rain gutters between the side walls of the body and the roof, as shown in the figure. The KUMOHA53 008 was also released in 2013.

**Fig.2-41**: The picture shows the KUHAYUNI56 and a pair of KUMOHA42s, whose prototypes operate along the entire 200km stretch of the Iida line from Toyohashi to Tatsuno. The models were released as the second Iida line series.

**Fig.2-42**: The KUMOHA42 (front) and the KUMOHA53 (behind) are motored cars with dual driving cabs and a single, respectively, which originated from the same group of Series 43 electric cars.

**Fig.2-43**: A motored KUMOHAYUNI64 or an un-motorized KUHAYUNI56 with a separate room for passengers was coupled to the passenger cars for baggage and postal delivery to towns and villages along the Iida line.

**Fig.2-44**: The KUMONI13 (front) and the KUMONI83 (behind) are motored cars with dual driving cabs built for baggage transportation only. Before automobiles were popular, the railroad played an important role in commodity distribution.

**Fig.2-45:** The streamlined nose of the KUMOHA52, which was manufactured before World War II, is beautifully constructed even by today's standards. However, it is not easy to make a model of this streamlined electric car.

**Fig.2-46**: The original style of the KUHA47 has narrow windows and multiple arrays of rivets, which implies the age of the car is older than those of the Iida line.

**Fig.2-47**: Only one KUMOHAYUNI64 type motored car was ever made, which had dual driving cabs for baggage and postal transportation in addition to passengers. The car was originally introduced to the Yokosuka Line with a brown painted body. This train operated in different areas and regions, but eventually settled on the Iida line.

**Fig.2-48**: The JNR direct-current electric ED19 locomotives were originally imported from the U.S.A. Two ED19 2 and ED19 6 locomotives were selected for model production among six of the ED19s. The ED19 6 has a body that keeps nearly all of their original side wall style.

**Fig.2-49**: On the Iida line, many freight trains operated due to the large demand of freight transportation, despite being a local line. The ED19 2 has a nearly original front shape and its model was released with a set of tank cars, "TAKI10600," specified for the transportation of cement.

**Fig.2-50:** Around 50 years have passed since the first operation of "Shinkansen," the super express train in Japan between Tokyo and Osaka along the new Tokaido line. The development of technology for the Shinkansen and the extension of the Shinkansen lines from Tokyo produced a variety of electric cars from the East Japan Railway Company. The nose of this streamlined train optimized aerodynamics. Today, Shinkansen trains with different shapes, designs, and colors attract attention from people of an independent generation. The picture shows, from left to right, Series E5 in green and white, Series E6 in red and white and Series E7 in blue and white.

**Fig.2-51**: From 2011 to 2014, new Shikansen electric cars (Series E5, E6 and E7) were developed for operation along the Tohoku Shinkansen line, Akita Shinkansen line, and Hokuriku Shinkansen line, respectively. The Series E6 bodies are smaller than others due to the Akita Shinkansen line's smaller construction dimensions. All of the Shinkansen models, Including the Series E6 and existing older prototypes, were designed to 1/160 scale instead of 1/150 scale, which is applied to prototype models from the "normal" lines.

**Fig.2-52**: Series E5 and E6 Shinkansen electric cars on the Tohoku Shinkansen Line. These models have built-in couplers, referred to as "open nose couplers" in the front of the nose.

**Fig.2-53**: A large group of Series E233 direct-current electric locomotives, operated by the East Japan Railway Company, dominates the JR commuter railway network in the Tokyo metropolitan area. In the Series E233 electric

cars there are variations in the details on the roof and under the floor in addition to the color difference of stripes. After the release of models with an orange stripe, representing the Chuo line, variations have been added, reproducing the precise details of the train.

**Fig.2-54**: In 2006, the first E233 Series locomotive was introduced to the Chuo line. The production of these models began from this line after its introduction.

**Fig.2-55**: Series E233 trains with different specifications are classified by car numbers using multiples of 1000, as is listed at the top of page. The Series E233 6000 from the Yokohama line has green and yellow green stripes. The model also reproduces the illustration on the side walls from the prototype.

**Fig.2-56**: The Limited-express train of Kintetsu Corporation Series 10100 introduced double decker cars in the 1960s. The train enjoys popularity and fame as the representative train of Kintetsu Corporation in the past. The inclusion of double decker cars has influenced many other luxurious limited-express trains operated by the relevant railway company up to today.

**Fig.2-57:** Two different models of Kintetsu Series 10100 were released. One is the prototype model in the original style released as an item in the "legend collection," and the other is based on the modified prototype style released as a normal item. In both prototype models there are three different compositions of trains distinguished by A, B and C, where the compositions A and B include a streamlined lead car.

**Fig.2-58** In the 1960s, many private railway companies introduced luxurious cars for limited-express trains. Odakyu Electric Railway developed the Type 3100 NSE (New Super Express) "Romance car" as the successor to the Type 3000 SE. In the Type 3100, two-axle trucks were located between the coaches and the driving cab was moved the front roof of the head car. Such unique structures were succeeded by a part of Romance cars of later generation.

**Fig.2-59**: Two different models of Type 3100 NSE were released. One is the model for the original prototype released as a "legend collection" item. The other is a model for a prototype with increased cooling power (distinguished by additional coolers on the roof), which was released as a normal item. These models were developed paying attention to the revised joint structure between the cars, the reproduction of an observation room and a cab, and the reproduction of the prototype's lowered center of gravity.

**Fig.2-60:** The Series 5000 was introduced as the first limited-express "Red Arrow" by the Seibu Railway on the Chichibu line's opening in 1969. At the same time, the high-performance commuter train Series 101 and E851, the first private railway electric locomotive with six driving axles, went into service.

**Fig.2-61**: The six cars (front) were released first, followed by the set of four cars in early phase paint (behind). The two head cars allow for the composition of eight or ten cars, which follows the prototype trains of today.

**Fig.2-62**: The model of the Tokyu Corporation Series 5050-4000 commuter train was delivered as a set of 10 cars, or as two standard sets along with an add-on.

**Fig.2-63**: This commuter train, as well as the limited-express, exhibits particular characteristics relevant in the private electric railway. Commuter transportation, which is diversified today under the conditions surrounding the commuter line, reveals its own unique characteristics to us. The situation is quite different from what existed in the past where commuter trains served as transportation only. The Tokyu Corporation Series 5050-4000 commuter train plays an active role in a wide area around the Tokyo metropolitan due to the expansion of its operation range to lines of other private railways via the subway line.

**Fig.2-64**: The Hankyu Railway Series 9300 is operated as a limited-express train while simultaneously keeping the character of a commuter train. There are three doors for passengers on each side of the car.

**Fig.2-65**: The maroon color traditionally painted on the all of the electric car bodies is well known and recognized as the train color on the Hankyu Railway. On the models, an adjusted painting process was repeated to reproduce the accurate color and a gloss finish.

**Fig.2-66**: The Seibu Railway Series 101 represents commuter trains of one generation ago. It was introduced in 1969 with the Series 5000 "Red arrow." The group of Series 101, including a head car with an established Seibu face, occupies the largest number of electric cars running along the Seibu lines.

**Fig.2-67**: Variations of the models for this train for 4, 6, and 10 cars, and for different style coolers, were prepared. The "Red electric car" prototype model was also released with an older paint scheme, which existed recently for a short period.

**Fig.2-68**: Type 2100 electric cars were developed for the limited-express train which became the traditional representative of the Keikyu Corporation. The train was characterized the "so-fa" sound it would make, emanating from the motor control inverters which were replaced prior to 2014. In the model, we can still enjoy the sound by using the KATO "Sound box" system, introduced in Section 7.21, Chapter 7.

**Fig.2-69**: The model of the Keikyu Corporation Type 2100 reproduces the distinct front shape of the head car, the interior seating visible through the windows, and the controlling equipment, produced by Siemens, under the floor.

**Fig.2-70**: Toyama Light Rail took over the tracks of the JR Toyamakou line and introduced a Light Rail Transit (LRT) system to extend its operation to the tram line in downtown Toyama City. The objective was to test a new system of urban traffic between the city and surrounding towns. LRT trams of seven different colors were manufactured for the start of this operation.

**Fig.2-71**: Development of the TLR 0600 was a great technological challenge for N-gauge manufacturing. The see-through room interiors for the low floor prototype required a driving unit assembly on the bottom of the body. In addition, a stable low velocity drive was required for the operation of the tram. Body details are needed for today's N-gauge models regardless of its small size. At the same time, the "UNITRAM" street track system proved a unique challenge for N gauge. The UNITRAM system released and can be used for various creative applications by model railroaders. Cf. Section 7.19, Chapter 7

**Fig.2-72**: The features of the LRT, such as the roof equipment, required joint structures for the body, cables and dampers, all of which are reflected accurately on the N-gauge model.

**Fig.2-73**: The FEF-3 is a preserved steam locomotive for the Union Pacific Railroad and is a very popular active locomotive today in the United States. It operates pulling excursion trains decorated in a UP paint scheme.

**Fig.2-74**: A coreless motor is used for the model FEF-3, which allows for the large tractive power required by the prototype and the reproduction of details around the boiler and the cab. Both the appearance and large dimensions differ from those of Japanese steam locomotives and are one of the more attractive points for Japanese users.

**Fig.2-75**: The baggage car, bearing the image of the United States flag, and the observation car, located at the end, are very impressive among the cars composing the UP "Excursion train."

**Fig.2-76**: The Southern Pacific Lines GS-4 #4449 is a beautiful steam locomotive with stripes of orange and red painted for the "Morning Daylight" train consist. This model has the traction power for pulling as many as 18 cars. This train has maintained a high level of popularity, despite the fact that it was produced with the standards of one generation before.

**Fig.2-77**: Although the GS-4 has the same axle arrangement of a 4-8-4 Northern, as with the FEF-3, the streamlined body of the GS-4 shows power and a beautiful style. The differences between these two locomotives are attributed from their inherent applications: the GS4 pulling primarily passenger trains, while the FEF-3 primarily pulls freight.

**Fig.2-78**: The 4449, officially retired from service in 1958, was restored in 1974 for the United States Bicentennial, and still operates excursions today. The model "Morning Daylight" passenger cars were released alongside the GS-4, which displays the beauty of the train as seen today as it did in the 1940's.

**Fig.2-79**: The Amtrak "Superliner" is famous as a modern version of a traditional transcontinental train car in the U.S. Models wear different paint schemes depending on their operation period, all of which are produced and researched by KATO USA. Despite the 1/160 scale of the passenger cars, a large double decker passenger car, when compared to the 1/150 scale Japanese prototypes models, comes as a surprise.

**Fig.2-80**: A lounge car, with its distinctive windows along the sides and roof of the car, is unique among Superliner passenger cars.

**Fig.2-81**: The GE P42 "Genesis" is a diesel-electric locomotive used by Amtrak to pull "Superliner," Amfleet" and "Viewliner"passenger cars in the United States. It is usually operated via double-heading along the mountainous lines of the western part of the U.S. Due to construction restrictions, P42's cannot operate in electrified regions along the East Coast.

**Fig.2-82**: The ACS-64 electric locomotive, pulling "Amfleet" passenger cars, represents a style of Amtrak trains prevalent on the East Coast. The model of the ACS-64 was released in 2015 along with a new style of Amfleet car body types.

**Fig.2-83**: The ACS-64 as Amtrak's latest locomotive pulls passenger trains connecting cities located on the East Coast of the United States. The locomotive, manufactured by Siemens in Germany, has a European design, which is quite unique from that of typical American locomotives.

**Fig.2-84**: The TGV is an internationally famous high-speed train in France. Much like the Shinkansen in Japan and the ICE in Germany, the TGV is expanding its operation area in Europe and evolving the specifications of the train. The picture shows the second generation "Thalys" PBKA, which connects the Paris-Nord(P) with Bruxelles(B), Köln(K) and Amsterdam(A). Kato produced an N-gauge model of the first generation TGV Sud-Est in 1983.

**Fig.2-85:** We imagine today's TGV in a silver and blue color, however TGV trains of different colors also operated depending on their application and destination. The picture shows the Thalys (behind) and Lyria (front). These recently produced models have built-in couplers on the front nose to replicate two-unit TGV train formations.

**Fig.2-86**: The production of the RhB "Glacier Express," a famous tourist train, was regarded as a challenge for Japanese model train manufacturers to enter the European market. A series of models, designed using the same concept for Japanese prototypes, is widely accepted in Europe and its production and export are still active.

**Fig.2-87**: The Glacier Express is pulled by a Ge4/4 III, the latest locomotive on the Rhätische Bahn. There are three different color paint schemes on the Ge4/4 III model: a standard red color, included in the original release, a color

celebrating the world-heritage listed by UNESCO, and a "GLACIER ON TOUR" color scheme, which is often seen on many sightseeing brochures.

**Fig.2-88**: The "Bernina Express" operates across the border from Chur, in Switzerland, to Tirano, in Italy, via St Moritz. The Bernina Express runs along a glacial lake located on a high altitude mountain. The train includes panorama coaches of different styles and lengths from those of the Glacier Express. Today, the train is pulled by an ABe8/12 "Allegra," which has the features and equipment of an electric car and the traction power of a standard locomotive.