= NSB Di 3 =

NSB Di 3 is a class of 35 diesel @-@ electric locomotives built by NOHAB for the Norwegian State Railways ( NSB ) . The class was built between 1954 and 1969 , and delivered in two series , Di 3a and Di 3b . They are based on the Electro @-@ Motive Division F7 and are equipped with EMD 567 engines . They have a distinct bulldog nose and were numbered 602 ? 633 ( a @-@ series ) and 641 ? 643 ( b @-@ series ) . The locomotives had a prime mover that gives a power output of 1 @,@ 305 kilowatts ( 1 @,@ 750 hp ) . The a @-@ series has a Co 'Co ' wheel arrangement , while the b @-@ series has ( A1A ) ' ( A1A ) ' . The b @-@ series has higher top speed , but lower tractive effort .

The class was the dominant locomotive on NSB 's unelectrified lines . It was ordered as part of the company 's dieselization of services during the 1950s and 1960s , and was initially used on the three mainline routes of the Bergen , Dovre and Nordland Lines . In the 1960s the Bergen and Dovre Lines were electrified and the Di 3 units transferred to smaller lines , such as the Meråker , Valdres , Røros , Solør and Rauma Lines . They remained in service with NSB until 2001 , five years later than planned due to NSB returning their successor , the Di 6 . The units are still in use by the private operator Ofotbanen , the Kosovo Railways , an operator in Sicily , and the Norwegian Railway Museum . The class is similar to the DSB Class MY and MÁV M61 .

= = Construction = =

The first diesel locomotive used by NSB was a single Di 1 unit delivered in 1942 . It was more cost @-@ efficient than the steam locomotives used on the non @-@ electrified lines , and in 1945 , NSB decided that it would not order more steam locomotives . General Motors ' Electro Motive Division ( EMD ) made a bid to deliver twelve units based on their F7 , and NSB agreed to lease a single unit for trial . The body and mechanical components were built by NOHAB , the motors by ASEA and prime mover by EMD . While under production in 1954 , GM shipped a G12 for trial in Norway and Sweden . It was tested on the express train on the Dovre Line on 7 August , but proved to have insufficient power , causing the train to be 20 minutes late .

The trial unit from NOHAB was delivered on 17 September 1954 . The first test runs in scheduled service were on the Nordland Line between Trondheim and Mo i Rana in October . There were no technical faults until 22 December , when a grounding error caused the locomotive to be grounded until 17 January . In March the unit was sent back to NOHAB and went on a marketing tour that would eventually reach Ankara , Turkey in 1955 .

The locomotive returned to Norway on 1 July 1955 , where it was numbered 602 and put into service on the Nordland Line . The trials were successful , with much higher regularity than the steam locomotives . The Di 3 was used eight days in a row , and then spent a single day in the depot . NSB signed an agreement with NOHAB for delivery of five further locomotives . This caused a public debate , because the domestic supplier Thune had offered to build a similar locomotive in cooperation with American Locomotive Company . The first delivery was made on 25 April 1957 , and the order completed by July . In March 1957 NSB received permission to buy another eight locomotives . Delivery started in October and was completed on 1 June 1958 . The order was supplemented with another six trains , with delivery in 1958 .

The Finnish State Railways ( VR ) ordered five units in 1959 , but these were cancelled for political reasons . The units were offered to NSB for a reduced price . Three were designated Di 3b because they had a slight specification variation , with a ( A1A ) ' ( A1A ) ' wheel arrangement and higher top speed . Two units had come short enough in the production process that they could be given the same specifications as the other Di 3a units , but received a slightly longer body . The Di 3b were given the numbers 641 ? 643 . For part of 1960 , no . 623 was leased by NOHAB and sent on a demonstration tour in Eastern Europe . This resulted in an order from the Hungarian State Railways , where it became the MAV M61 . The Røros Line was upgraded and the Bergen Line units transferred to Trondheim in 1960 , but increased need for hauling forced NSB to not use the units on the Røros Line until the delivery of the next batch of six units in 1965 . The final delivery , of four

units , was made in 1969 .

= = Operation = =

The initial use for the Di 3 was to operate the three non @-@ electrified long @-@ distance lines of NSB : the Bergen Line , the Dovre Line and the Nordland Line . Following the delivery of the first batch in 1957 , they were from 2 June used on the Dovre Line , north of Otta to Trondheim , and further north along the Nordland Line to Mo i Rana . The stock was sufficient to replace all steam locomotives on the Nordland Line , and reduced travel time by one hour . From Hamar to Otta , the track did not have sufficient permitted axle load . From the second batch of eight units , five were put into service on the Bergen Line , the rest on the Dovre and Nordland Lines . Necessary upgrades of the permitted axle load had been made to the Dovre Line and Nordland Line , and the locomotives were in use from Hamar to Saltdal . On 30 November , the Nordland Line was completed to Fauske , and the full length operated with Di 3 .

The first section of the Bergen Line , the Gjøvik Line and the Roa ? Hønefoss Line , was electrified in February 1961 . This allowed diesel and electric locomotives to haul all trains from Oslo to Bergen . In 1962 the Nordland Line was completed to Bodø , but the increased need for locomotives was more than compensated by the electrification of the Bergen Line being extended to Ål . The first Di 3 ran on the Røros Line in 1964 , that had previously been denied due to bridges with insufficient axle load permits . In 1965 , the Bergen Line was electrified , and all but one Di 3 was transferred to Trondheim . A single unit , usually no . 610 , was stationed at Finse Station as a snowplow . Along with additional deliveries , there were sufficient Di 3 units to terminate most steam operations .

After the Bergen Line was electrified , the work continued on the Dovre Line . The section from Hamar to Otta was finished in 1967 , and the following year to Dombås . This allowed the locomotives to be transferred to secondary lines . With the final delivery of the last units in 1969 and the completion of the electrification of the Dovre Line in 1970 , the final steam locomotive was taken out of service . During the last half of the 1960s , the Di 3 was put into service on the Rauma Line , the Røros Line , the Solør Line , the Valdres Line and the Meråker Line .

In November 1970 , the Dovre Line was electrified , and the last steam locomotives were retired . A long @-@ term plan to electrify half the lines was finished , and for two decades , NSB 's operations were very stable with no major investments to infrastructure or closing of lines . NSB had slightly less diesel locomotives than they needed , but plans to order additional Di 3 was never fulfilled . In 1981 , NSB took delivery of five Di 4 to supplement the older units . They were mainly used on the Nordland Line , and Di 3 units were predominantly used on the other lines , although they continued to operate som trains on the Nordland Line . On 1 April 1987 , a Di 3 612 caught on fire ; the damage was small enough that it could have been repaired , but NSB instead decided to put aside the unit . At the time NSB planned to order additional Di 4 , but these plans were put on hold . In 1988 , the Valdres Line was closed ; this was the only time a line with Di 3 in regular service was closed .

During the 1980s , NSB started leasing SJ T44 @-@ locomotives from Sweden to supplement the Di 3 . In 1992 , the decision was made to order 12 Di 6 and 20 Di 8 to replace the Di 3 . The former was based on the Di 4 and had twice the power of the Di 3 . The Di 8 was slightly more powerful than the Di 3 , and were intended for freight trains . Both series were put into service in 1996 , but the Di 6 proved to have so many technical problems that they were returned to Siemens in 1998 . The Di 3 units had been set aside and some had been scrapped , but the return of the Di 6 forced NSB to put the units back into service .

During the mid @-@ 1990s , NSB had initiated a program to replace the traditional locomotive and carriage trains with new , tilting multiple units . This had led to the order of sixteen Class 73 four @-@ car units for the three mainline routes on the Bergen Line , Dovre Line and Sørland Line . To supplement this , the board of NSB decided on 14 November 1996 to purchase seven tilting diesel multiple units for the Røros and Rauma Lines . The choice fell on Class 93 , with fifteen units eventually delivered . This allowed all passenger trains on diselized lines to either be operated with Class 93 be hauled by the Di 4 . The last Di 3 @-@ hauled train ran on 7 January 2001 .

= = = Post @-@ NSB = = =

With the delivery of Class 93 , NSB started to retire or sell the Di 3 . In November 2001 , five units were sold for NOK 250 @,@ 000 each ? well under market price ? to the new private operator Ofotbanen . The purchase raised controversy , because the potential operator Banetransport had offered full market price for the trains . One year after delivery , six of eleven Class 93 @-@ locomotives were out of order . To solve the problem , NSB had to rent back used Di 3 locomotives from Ofotbanen . NSB had chosen to sell the old locomotives for less than market price , but Ofotbanen demanded that NSB pay the entire purchase price for the short @-@ term rental back .

Four units ( 619 , 633 , 641 and 643 ) were sold to the United Nations and was put into service in Kosovo , in what has since become the Kosovo Railways . Four units ( 622 , 626 , 630 and 631 ) were sold to an operator in Sicily , Italy . The Norwegian National Rail Administration bought one unit ( 628 ) for maintenance , and has painted it yellow . The Norwegian Railway Museum in Hamar has preserved three units , of which two ( 602 and 616 ) were operated by GM @-@ Gruppen and one ( 615 ) is kept for spare parts . NSB has kept one unit as reserve at Ål Station . The remaining units have been scrapped , put aside or sold as spare part units .

= = Specifications = =

The Di 3 was built by Nydquist och Holm of Trollhätten , Sweden , as part of a series of GM EMD AA16 locomotives in Europe . They are technically similar to the DSB Class MY of Denmark and the MAV M61 of Hungary . The locomotives are powered by a 16 @-@ cylinder EMD 16 @.@ 567 C or E engine that has a power output of 1 @,@ 305 kilowatts ( 1 @,@ 750 horsepower ) at 835 revolutions per minute ( rpm ) . The engines power an EMD D32 or D12 generator that feeds six ASEA LJB76 or LJB84 motors on a Di 3a . The Di 3b is equipped with four EMD D40 or D77B motors . This gives a tractive effort of 265 kilonewtons ( 60 @,@ 000 lbf ) for the a @-@ series and 176 @.@ 5 kilonewtons ( 39 @,@ 700 pounds @-@ force ) for the b @-@ series . The motors have a power output of 1 @,@ 100 kilowatts ( 1 @,@ 500 horsepower ) . The maximum speed is 105 kilometres per hour ( 65 mph ) for the a @-@ series and 143 kilometres per hour ( 89 miles per hour ) for the b @-@ series .

The steel bodies are 18 @.@ 60 or 18 @.@ 90 metres ( 61 @.@ 0 or 62 @.@ 0 ft ) long . The longer length is for the three b @-@ series units and the two a @-@ series locomotives that were made in the batch , originally intended for VR . The a @-@ series has a Co 'Co ' wheel arrangement , while the b @-@ series has a ( A1A ) ' ( A1A ) ' arrangement , where the center of the three axles on each bogie is unpowered . The wheels have a 1 @,@ 016 millimetres ( 3 ft 4 @.@ 0 in ) wheel diameter and the locomotives have a weight of 102 @.@ 0 tonnes ( 100 @.@ 4 long tons ; 112 @.@ 4 short tons ) for the a @-@ series and 103 @.@ 0 tonnes ( 101 @.@ 4 long tons ; 113 @.@ 5 short tons ) for the b @-@ series . The trains can be run in multiple with the Di 4 , Di 6 and Di 8 . All the Di 3 engines featured a bulldog nose , the only locomotive type in Norway to do so . The locomotives were at first delivered in a dark green livery , but during the 1960s this was changed to red , and the last delivered units never had a green scheme .