



ELWOODS RALLY

Standard locomotive

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The most exported locomotive from Sweden is a locomotive produced in its first specimen in 1967 and in its last in 1988. It have been, and are, used in all sorts of trains and to all sorts of duties from passenger trains to switching duties. It has been test driven in near 200 kph and produced in over 300 specimens. I give you the well-known Rc-locomotive.



Rc6 1398 in Östersund 2003.

In February 1988 the last specimen of the new Swedish standard locomotive was delivered. It was a locomotive from the sixth generation of the well-known Rc-locomotive, in other words a Rc6-locomotive. 360 Rc-locomotives were produced in six generations, from 1967 to 1988. Before the Rc-locomotives the D-locomotives were the standard locomotive in Sweden, it was pulling both passenger och freight trains. In 1953 the Swedish Government's Railroads (SJ - Statens Järnvägar) ordered two test-locos from Asea for express trains. The locos became popular and the test results were good so eight more locos of the same type, called Ra or Rapid, was ordered. One of the new features on these locos were the bogies, no other loco, in Sweden, had had that construction before.

The Ra-locomotives were only meant to pull express trains and in the end of the 1950's SJ wanted a new standard locomotive and therefor ordered three test-locomotive series with two locos each from Asea, and with these locos Asea could also test new techniques. The three locomotive series

were called Rb1, Rb2 and Rb3. The Rb2 och Rb3 locomotives were technically the same with differences only in measurement and weight. All the Rb-locomotives had a similar bogie-construction as introduced in the Ra-locomotives. The Rb1-locomotives had direct current motors, while the Rb2 and Rb3 had alternating current motors. Later one of the Rb1-locos got notch-less throttle, thanks to a motor control system based on silicon rectifiers.

Rb1 becomes Rc

The Rb1-locos were the test-locos that lead to the big series of Rc-locos. The Rc-locomotives have DC-motors and notch-less throttel control of the similar silicon rectifier technique tested in one of the Rb1-locos. Also similar bogie configuration to the Ra- and Rb-locos are used in the Rc-locos. Each locomotive have two bogies with two wheel axles each and one motor per wheel axle. The axle arrangement is therefore Bo'Bo'. The first generation of Rc-locomotives were used both in passenger and freight trains, but formost they were used in the express trains replacing the Ra-locos that were given other duties. All Rc-locomotives of the first series are today covered with radio control for swiching duties.



*Rc1 1025, modernized.
Photographer: Fredrik Tellerup.*

The locos weigh 76,8 tonnes, have a total power output of 3600 kW and have disc brakes. The max speed is 135 kph (84 mph). From the beginning the first series of Rc-locos had the type designation Rc, but when the second series/generation was delivered the first series got, logically, the type designation Rc1. The Rc1-locos have been modernized during the years with e.g. new air intakes and some also got new or different pantographs. Totally 20 Rc1-locos were produced.

The Rc-locos were painted in the same color as the Ra- and Rb-locos, but in an other paint scheme. The under carriage was painted in black with type designation and individual number in

white. The body was orange with a broad white line on the side ending in a v-formation in the front. The roof was grey. All Rc-locos were originally painted this way but later SJ painted them in a blue paint scheme with a red line along the side continuing around the front (and rear) to the other side. The under carriage was light grey with white type designation and number. Many locos still got the blue paint scheme, but as more companies enter the railway market other paint schemes are also used.

The second series was delivered from 1969 to 1975 with the type designation Rc2. These are very similar to the Rc1-locos with only minor changes. The "2" in the designation mainly refers to that it's the second series. The Rc2-locos have also been modernized with new air intake, etc. Some of the Rc2-locos are converted with radio control. 100 Rc2-locos were totally produced.

With the Rc-locos Asea got a construction they could export to other countries. One of the countries the Rc-construction was exported to was Austria. The government in Austria bought 10 locomotives with similar construction to the Swedish Rc2-locos in the beginning of the 1970's. In Austria the locos got the designation 1043. In 2001 the Swedish train company Tågakeriet i Bergslagen (Tågab) bought 9 of the Austrian Rc-locos, and they got the designation Rc2 ÖBB (or ELL) in Sweden. The Austrian Rc2-locos had partly different braking system and other pantographs and some of them had more powerful motors. When the locos returned to Sweden the braking system was changed to the same as on the Swedish Rc2-locos and they were generally restored.



Austrian loco back in Sweden as ELL 0003.

Photographer: Stefan Åhman.

In the beginning of the 1970's SJ ordered 10 Rc-locos with higher max speed, 160 kph (100 mph), the type designation became Rc3. Apart from the maximum speed they are the same as the Rc2-locos. During the 1990's 23 Rc2-locos were converted into Rc3-locos. Also some of the Rc3-locos are converted with radio control.

To Norway and USA

During the end of the 1970's and the beginning of the 1980's the fourth series of Rc-locomotives was produced and delivered. General improvements were done. The Rc4-locomotives weigh slightly more: 78,0 tonnes. The max speed was the same as the Rc1-2-locos, 135 kph. The Rc4-s were used in all sorts of trains from the beginning but are now only pulling freight trains. Some of the Rc4-s still have the original orange paint scheme. Between 1976 and 1977 Amtrak, USA, borrowed the loco Rc4 1166 as X 995 for test driving. They drove it with a maximum speed of near 200 kph (125 mph). The test-drive led to orders of similar locos from Amtrak, and other train companies in USA, to Asea. 130 Rc4-s were produced.

There is also a Norwegian version of the Swedish Rc4-s, E116, which also has, apart from all equipment from Rc4, higher power output (4440 kW vs. 3600 kW), an extra electrical braking system and reinforced and pointed front (and rear) so the loco can run through snow obstacle without damage. Some of the E116-locos were not needed in Norway so in the beginning of 2003 the Swedish train company Tågkompaniet (TKAB) bought six E116-locos for use in Sweden. TKAB are painting the locomotives in their red and white paint scheme. The E116-s weigh also a little bit more than the Rc4-s, 80 tonnes.



Norwegian Rc-loco, E116 24, in Sweden.

Photographer: Carl-Erik Steen

One additional version of the Rc4-locos was built. A variant for the Ore line (Malmbanan) in the very north of Sweden. Their designation is Rm. The differences here are higher weight, 90 tonnes; lower gear ratio so the max speed is only 100 kph (63 mph) and stronger bogies and suspension. Today the Rm-locos are used in freight traffic all over the country. When the Rm-s only were used

on the Ore line they had automatic couplings, but now they have conventional screw couplings. The Rm-s don't have disc brakes, they have electrical dynamic brakes and shoe brakes.

Fifth and sixth

The fifth series of Rc-locomotives was delivered to SJ from 1982 to 1986. Type designation: Rc5. Today there is no Rc5-locos in traffic, all have been converted to Rc6. As the Rc4, the Rc5 had maximum power of 3600 kW and a max speed of 135 kph. The Rc5 got stronger windshields and new, bigger air intakes. The newest feature on the Rc5-locos was the vehicle computer, a indication and error detecting system, which was needed because the locomotives got more electrical equipment and the electrical equipment became more advanced. The driver or a repair man could see via a display both errors occur recently and in the past. Rc5 1362 was the 300th Rc-locomotive and a total of 60 Rc5-locomotives were produced. The technique from the Rc5, including the vehicle computer, was carried over to the last series of Rc-locomotives, the Rc6-s. The only difference between the Rc5-s and the Rc6-s was the max speed. The Rc6-locos have a max speed of 160 kph (100 mph). 40 Rc6-locos were produced, 60 were converted from Rc5 to Rc6.

Rc6 no. 1348-1382 have so called SMS, **not** Short Message System, it's a shortening in Swedish for serial multiple unit operation. It means that the multiple operated locos (several locos - only one driver) don't have to be in the same end of the train, there can be one loco at each end of the train or a loco at one end and a control cab coach at the other. Such a control cab coach is the AFM7 with first class seats and luggage space. This configuration essential shortens the turning-time.

Blue X

In 2001 the EMUs X2, used in the express train X2000, needed a lot of repair so SJ needed trains to replace them, they were called unofficial Blue X and official IC 11 or X2000R. The meaning was to drive these trains with a max speed of 180 kph (113 mph) so two Rc6-locomotives were fitted with higher gear ratio and were given the type designation Rc7. The cars for the Blue X trains also needed modifications to be able to run at 180 kph, but that never happened, so no Blue X train were driven faster than 160 kph. Both Rc7-loco have been converted back to a Rc6-locos. The Blue X locos (and cars) are painted in a special dark blue paint scheme. The under carriage is dark grey with type designation and number in white. The body is dark blue with red stripes at the bottom and top. The running-boards and railings are painted yellow.



Rc7 1421 with Blue X train, 2002.

Photographer: Fredrik Tellerup.

Multiple operation

The Rc-locomotives (Rc1-7) are multiple operatable up to three units. Also the Rc2 ÖBB / ELL (with an adapter), Rm and E116 are multiple operatable with the rest of the Rc-locos.

Today 354 or 352 (there is various information) Rc-locos - Rm, E116 and Rc2 ÖBB / ELL not included - are used in traffic. The ones with low max speed (Rc1-2, Rc4 and Rm) are mainly use in freight trains and for switching duties and the ones with high max speed (Rc3, Rc6-7) are used in passenger trains. There is nine Rc2 ÖBB / ELL and six E116 in use in Sweden.

Data

	Rc1	Rc2	Rc3	Rc4
Axle arrangement	Bo'Bo'			
Length	15470 mm (609")	15520 mm (611")	15520 mm (611")	15520 mm (611")
Weight in w.o.	80 tonnes	76,8 tonnes	76,8 tonnes	78 tonnes
Max speed	135 kph (84 mph)	135 kph (84 mph)	160 kph (100 mph)	135 kph (84 mph)
Power	4 x 900 kW = 3600 kW			
Built number	20	100	10	130



Control cabin of a ELL-loco (similar to Rc2).
 Photographer: Stefan Åhman.

	Rc5	Rc6	Rc7	Rm
Axle arrangement	Bo'Bo'			
Length	15520 mm (611")			
Weight in w.o.	78 tonnes	78 tonnes	78 tonnes	90 tonnes
Max speed	135 kph (84 mph)	160 kph (100 mph)	180 kph (113 mph)	100 kph (63 mph)
Power	4 x 900 kW = 3600 kW			
Built number	60	40	2	6

	Rc2 ÖBB	ELL	E116
Axle arrangement	Bo'Bo'		
Length	15580 mm (611")	15580 mm (611")	15520 mm (611")
Weight in w.o.	83 tonnes	79 tonnes	80 tonnes
Max speed	135 kph (84 mph)	135 kph (84 mph)	140 kph (88 mph)
Power	4 x 1000 kW = 4000 kW	4 x 900 kW = 3600 kW	4 x 1110 kW = 4440 kW
Bought number	6	3	6



Green Cargo paint scheme.

Type designation and axle arrangement

Type designation

R = electrical loco with bogies with two axles each.

EI = Norwegian designation for electrical loco.

ELL = electrical loco used in line duties (Banverket).

lower-case letters = different types.

numbers = generations or sub groups.

Axle arrangement

B = two driving axles.

o = each axle has an own motor.

' = designates the bogie.

Sources

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