

**- REEFSTEAMERS LOCOMOTIVE PROFILES -
CLASS 12AR NO.1535 'SUSAN' (EX-CLASS 12A)**



Our grand old lady, Class 12AR No.1535 'Susan' has the triple distinction of being the last surviving Class 12AR, our oldest operating locomotive and the oldest steam locomotive still operating on a South African main line. (Umgeni Steam Railway's Class 3BR is older, but operates on a branch line.)

'Susan' was originally built as a Class 12A by North British in 1919. The Class 12's, from which the Class 12A's originated, were the first new class ordered by the then-new SAR. The Class 12A was an upgraded Class 12 with larger cylinders, better valve porting and an improved boiler with a distinctive square-topped Belpaire firebox and a combustion chamber. Our Little Susie was the 15th Class 12A locomotive built in the first batch of 20. Between 1919 and 1929, 67 Class 12A's were built in 5 batches by 2 different manufacturers. (North British and Henschel & Sohn.)

The 12A's performed well in their designated duty, which was heavy coal haulage on the Germiston-Witbank line. They were good pullers with close-set 51 inch drivers. But the Belpaire fireboxes required complicated staying. The Class 12s and the derivative 12As came under CME A.G. Watson's reboiling program in the mid 1930s, but none of the standard designs would fit. A unique boiler design (Designed by CME Dr. Kobus Loubser) was applied to 42 Class 12A's, after an experimental fitting to two of them.

This led to the Class 12AR's distinctive look, with a large 6ft dia. boiler and the long smokebox overhang at the front. (The letter 'R' in '12AR' stands for 'reboilered.')

They also lost the combustion chambers and ran instead with an extra 'course' in the boiler. The active heating surface was actually slightly LESS – the new boilers designed more to maintain a thermal reserve rather than for quick steam raising. The crews preferred the old 12A's for easy steam raising, although the maintenance costs were higher.

The 44 reboilered locomotives served alongside more modern locomotives in the steam hubs of South Africa. In their later days, they were very useful, simple and robust shunters until displaced by the bigger Class 15CAs. A famous brace of 3 'super-shine' Class 12ARs operated in Kaserne. Unlike many other retired locomotives, no Class 12ARs were sold into mining or industrial service, which is one reason why No.1535 'Susan' is the last survivor. (Many mining locomotives outlasted those on the railways.)

In her last SAR years, No.1535 'Susan' worked as the Germiston Station pilot (Displacing 12R No.1947 'Rosie', who is also under our care) and was always fairly well looked after. The 'Susan' name is original from her days in service and she still bears the 'Germiston' cabside decals to this day. 'Susan' was never formally retired. She hauled heritage trains and specials throughout the late 1980's and participated in the last Great Steam Festival in 1990. She was briefly named 'Little Foot' at Magaliesburg by the then-Sports Minister, after one of the hominid fossils in the nearby Cradle of Humankind.

Unfortunately, she was prone to developing hot bearings on the front bogie axles and had problems with the steam-powered reverser. No.1535 was laid aside as unreliable after inexperienced repair attempts were made and leased to Reefsteamers. We sorted out the problems, which turned out to be incorrectly graded springs and piston cups that were installed back-to-front in the reverser's steam cylinder!

These days she goes well and is capable of about 100kph even with her small goods engine-sized wheels. (Of course, we do stick to speed limits.) The 'little' 12AR performed well until 2006 when she broke a bissell truck spring hangar. This coincided with a 3 year boiler certificate renewal, so she lay idle for 3 years alongside with then-incomplete Class 15F No.3046. With 7 new tubes and the valve gear bearings upgraded to Vesconite, she was restored to steam in 2009. 'Susan' has since become Reefsteamers' favourite locomotive for day trips. She is a sure-footed 'little' engine and with a 17 ton axle load, can handle our trains on gradients that would cause the bigger engines to slip. She is also an ideal training platform with her narrow but forgiving firebox and simple controls.

The locomotive is being partially re-tubed in July 2012 and is expected to run another 3 to 6 years before needing to have the known-wasted front tube plate replaced, which will be a major operation.

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Class:	Class 12A built – 1919-1929 44 x Reboiled 12AR from 1943.
Designer:	C.M.E. David Hendrie.
Builder(s):	Originally built by North British Locomotive Company in 1919.
Configuration:	4-8-2 'Mountain.'
Track Gauge:	3 ft 6 in (1,067 mm) Cape Gauge.
Driver Wheel Diameter:	51 in. (1,300 mm)
Total Locomotive Length:	69 ft 7 in. (21.209 m)
Height:	12 ft 10 in (3.912 m) as built. 13 ft (3.962 m) Reboiled.
Valve Gear:	Walschaerts. (With powered Reverser)
Frames:	Plate Frame with split saddle.
Loco Weight:	100.6 tons as built. 100.8 tons reboiled.
Max. Axle Load:	17.6 tons per driver as built. 17.7 tons on 3 rd driver reboiled.
Total weight on drivers:	70.3 tons as built. 70.1 tons reboiled.
Tractive Effort:	41,840 lbf. (186.1 kN) at 75% boiler pressure
Cylinder Size:	24 in. (610 mm) bore. (2 of) 26 in. (660 mm) stroke.
Locomotive Brake:	Vacuum.

Tender Type:	Type MT – Original tender.
Tender Weight:	67.1 tons working order.
Fuel Type:	Coal – Hand Fired.
Tender Coal:	12.2 Tons.
Tender Water:	27 000 Litres.
Boiler Dimensions:	As built: (12A Belpaire Firebox) 5 ft 10.5 in. (1.791 m) int dia 18 ft. (5.5 m) int length 7 ft 9 in (2.4 m) pitch Reboiled: (12AR) 6 ft. (1.83 m) int dia 19 ft 4 in. (5.90 m) int length 8 ft 6 in. (2.59 m) pitch
Boiler Pressure:	190 psi. (1,310 kPa)
Fire Grate Area:	41 sq. ft. (3.80 m ²)
Heating Surface of Tubes:	As built: (12A Belpaire Firebox) 158 tubes 2.25 in. (57.2 mm) ext dia 24 tubes 5.5 in. (140 mm) ext dia 2,308 sq. ft. (214.420 m ²) Reboiled: (12AR) 119 tubes 2.5 in. (63.5 mm) ext dia 30 tubes 5.5 in. (140 mm) ext dia 2,338 sq. ft. (217.207 m ²)
Heating Surface of Firebox:	200 sq. ft. (18.581 m ²) as built. 164 sq. ft. (15.236 m ²) reboiled.
Total Heating Surface:	2,508 sq. ft. (233.001 m ²) as built. 2,502 sq. ft. (232.443 m ²) reboiled.
Superheater Area:	515 sq. ft. (47.845 m ²) as built. 480 sq. ft. (44.593 m ²) reboiled.



Lil' Susie used to look like this – note the square-topped Belpaire type firebox. This is an original Class 12A No.1526 running her last years as a shunter at De Aar in 1979. (Pic by Malcolm Best.)



Class 12AR No.1535 'Susan', who started life as a 12A (left), pictured after servicing at Bethlehem Diesel Depot. This was on the 2009 Cherry Festival Train and the 12AR ran with 25NC No.3472. (Pic by Lee Gates.)