



UP115 compressor

May 2017

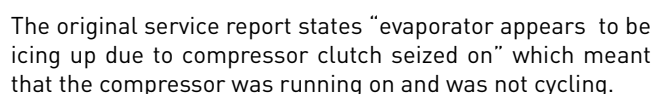
Unicla Cat. No. T1701

The purpose of this test is to examine and analyse a Unicla compressor model UP115 which has been in the field since 1994 and had worked for an estimated 17000 hours.



It is believed this compressor was one of the first R134a UP115 compressors introduced to Australia by Unicla, and it was fitted to this BOMAG road roller in 1994. The last UP115 sold in Australia was in 1995 and the model range was converted to UP120 the following year.

An intense inspection was carried out on this compressor by the Unicla Australia team after they had been informed about a faulty system by A1 Auto Electrics & Airconditioning in Moree, NSW Australia.



Another fault mentioned on the A1 service report was a leak found on the low side hose port fitting. However, the inspection report conducted by Unicla Australia revealed otherwise.



The compressor was pulled apart and each component tested individually. The working assembly, swash plate shaft, bearings , front and rear suction and discharge valves and seals were tested physically and visually. A leak test was

conducted to identify a possible leak on the body and/or the rear cap. And finally, the pistons and shoe discs were measured precisely to find the amount of wear to these parts due to the sliding and reciprocating friction from over 22 years operation.

Results

It was found that the compressor was not faulty and the issue was related to the clutch system.

Clutch

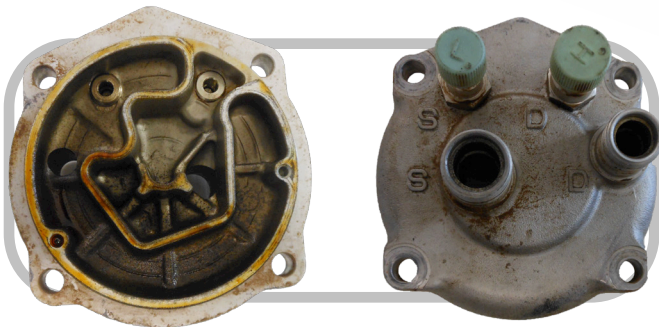
The clutch system was fine mechanically, however as it can be seen in images over a long period of time, a lot of mud and grime had worked its way between the armature plate and the pulley surface and had then jammed, effectively gluing the plates together.



The armature was jammed against the pulley by solidified mud and grime

Rear cap

The leak test also indicated that the compressor port or rear cap was not leaking and the actual leak was later found on the hose side of the connection.

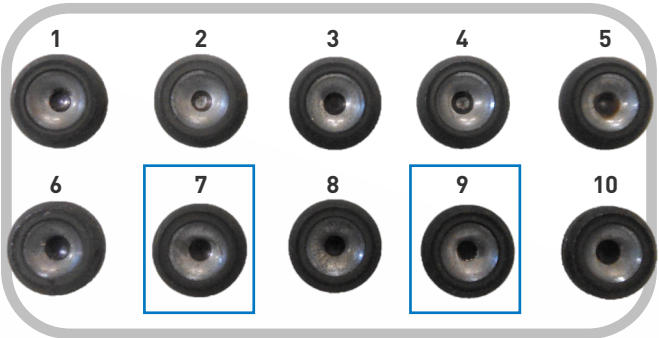


Rear cap

Shoe discs

The shoe disc thickness measurement results (in millimetre) are shown in table 1.

The thickness of the shoe discs normally are manufactured in the mid-range of 3.55mm. Considering the high working hours and conditions, and the fact the compressor was operating with low levels of gas and oil, caused by the offending gas leak on the suction hose, the wear was acceptable with only 2 of the 10 shoes discs showing out of tolerance wear (marked in red table below).



All shoe discs were slightly worn with number 7 and 9 reaching an out of design tolerance

Shoe disc number	1	2	3	4	5	6	7	8	9	10
Dimension (mm)	3.42	3.55	3.56	3.55	3.53	3.39	3.34	3.39	3.33	3.55
Allowance range	3.35 - 3.75 (3.55 ± 0.2)									

Table 1

Pistons and cylinder housing

The cylinder housing compression chambers and the pistons were showing average wear of only 0.05mm, which is an excellent result considering the life of compressor. This confirms Unicla's claim that the compressors maintain their compression after very long periods of use.

The piston ring and body measurement results (in millimetres) in table 2 show the minimum wear that has occurred on these parts since the time of manufacture of the compressor. Pistons originally measured 30.52mm and rings 30.47mm.



Pistons from the compressor

Piston number	Front ring D	Rear ring D	Body D
1	30.35	30.37	30.52
2	30.40	30.40	30.52
3	30.37	30.45	30.53
4	30.34	30.42	30.53
5	30.39	30.37	30.52

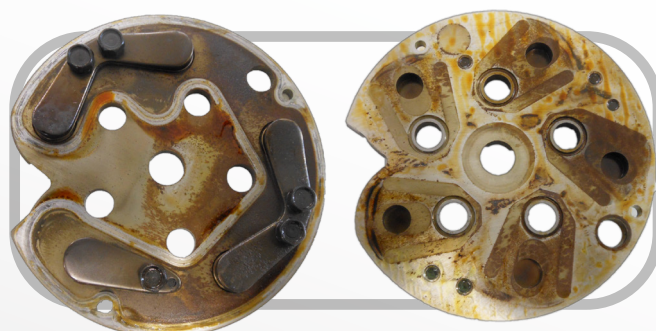
Table 2

Other parts

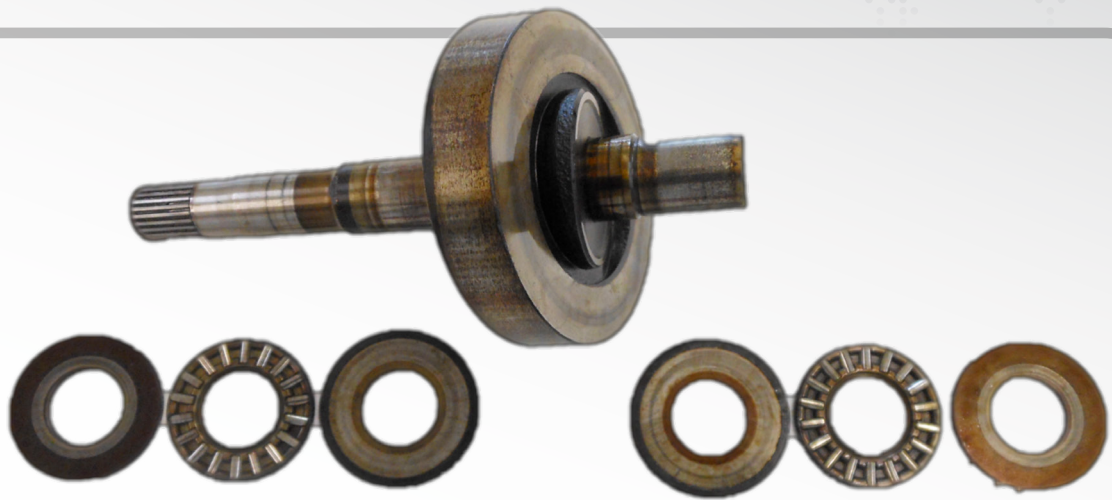
All internal components displayed signs of fatigue and overheating, but the compressor was still operational. The extreme overheating was caused by the low refrigerant flow and lack of compressor cooling.



Cylinder housing



Clear sign of overheating on valve plates



Swash plate shaft and bearings

Conclusion

- The R134a service ports were still in good condition
- The magnetic clutch was inoperable due to the jamming of the armature to the pulley
- The compressor was still operational except for the jammed armature
- No leak was found on the compressor
- The compressor was low on oil – it contained only 5cc whereas it should have been 50cc of its original 140cc charge
- The shoe discs and pistons were showing some understandable wear.



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For further information visit www.unicla.hk
Other references:
Unicla General Service Information (Cat.No.B0901)
Unicla Compressor Selection Criteria (Cat.No.B0902)