



Field Study

UWX550 compressor

Surfers Paradise Coaches Australia

February 2018

Unicla Cat. No. T1802

Introduction

The purpose of this field study is to examine the performance, durability and coupling integrity of a Unicla UWX550 compressor retrofitted to a hard-working bus air-conditioning system, and to demonstrate the capabilities of Unicla UWX series compressors in bus and coach applications in the harsh conditions of Australia.

Vehicle

The coach is a 1998 Australian-made Autobus, originally installed with a Coachair rooftop system. Operating in Queensland Australia, this coach transports tourists mainly over long distances through rural areas.

The vehicle has travelled a total of 1,328,562 kilometres. The Unicla UWX550 compressor was fitted in 2009 and has travelled approximately 544,253 kilometres of this distance.



Engine bay

Background

Surfers Paradise Coaches operates a fleet of 12.5-metre, 57-seat coaches from Melbourne to Cairns and inland to Birdsville, with each coach travelling around 80,000 to 150,000 kilometres per year. Condition temperatures vary from 45°C to below zero.

This coach was originally fitted with a Coachair rooftop unit and Bock FK40 compressor, but after hitting a bridge in 2003, the coach underwent major repairs and refurbishment, and a Sutrak 353 rooftop AC system was installed with another Bock FK40 compressor.

In June 2009, the Bock compressor was removed and a new Unicla UWX550 heavy-duty compressor was fitted.

System summary

Vehicle make	Autobus
Body type	57-seat touring coach
Engine	Cummins ISC30
Body specification and registration	Tare 13.5 ton GVM 21 ton Registration 730 GTL
A/C system	Sutrak 353 GEN II
Original compressor	Bock FK40
Compressor change details	UWX550 fitted June 2009
New compressor	Unicla UWX550 with 210 mm BB clutch – Special No. 295018

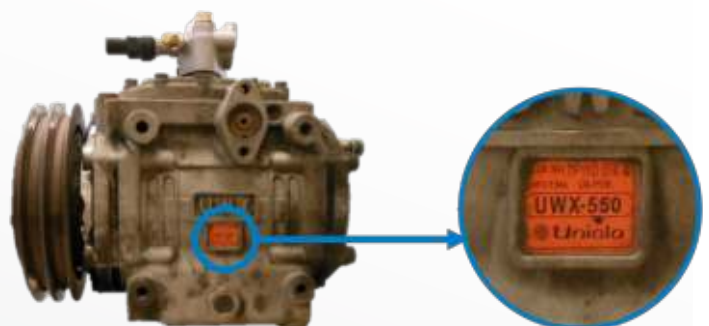


1998 Autobus coach (57 seater)

Service history

During the period of June 2009 to November 2017 the AC system was serviced five times, which included receiver drier changes, the replacement of four condenser fan motors and discharge line replacements (twice). In November 2017 the Unicla UWX compressor showed signs of leaking at the shaft seal, so it was removed for repair.

The Unicla technical team requested management at Surfers Paradise Coaches to provide the compressor for a detailed field analysis, so a new compressor was provided to them in exchange for this courtesy.



Results

Clutch

The clutch system was fine mechanically, however, as it can be seen in the images, over a long period of time dirt and grime had worked its way between the armature plate and the pulley surface. The clutch pulley also appeared to have diesel oil soaked over it but the pulley was still smooth and tight, and operating satisfactorily. With new bearings and a clean, the clutch could be returned to service.



Clutch set

Shoe discs

The sliding sides of the shoe discs were in good condition and within specification for their age. There was no damage to other parts of the discs and they could continue to function normally. The measurements can be found in the below table.

Shoe disc number	1	2	3	4	5	6	7
Height (mm)	8.70	8.70	8.72	8.70	8.69	8.71	8.70
Shoe disc number	8	9	10	11	12	13	14
Height (mm)	8.72	8.71	8.70	8.71	8.70	8.70	8.69



Shoe discs

Pistons and cylinder housing

The cylinder housing compression chambers and the pistons were showing minimum wear, which is an excellent result considering the life of compressor. This would confirm Unicla engineers' claims that the compressors can maintain their compression after very long periods of use.



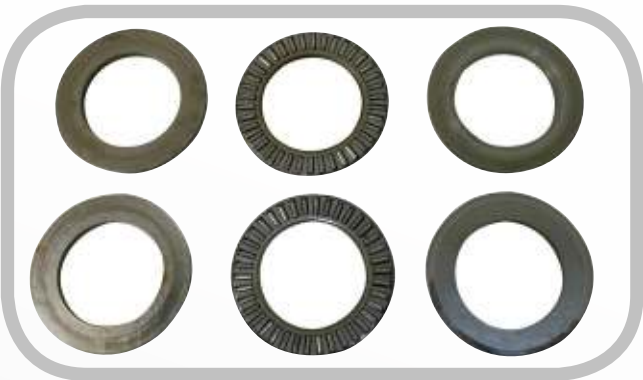
Pistons from the compressor



Cylinder housing

Thrust bearings and spacers

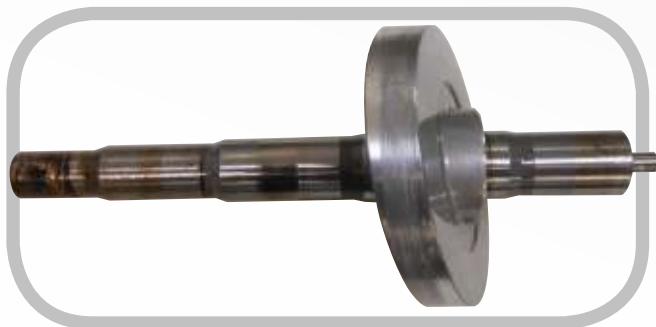
Showing normal wear with some slight scoring in the rear washers.



Thrust bearings and spacers

Swashplate

Nothing significant was found. Normal operational wear was visible on the plate and shaft.



Swashplate

Rear cap and oil plate

The rear cap and oil pump were both in good condition, with the rear cap showing some slight scoring in the oil pump chamber.



Rear cap

Front and rear cap O-ring

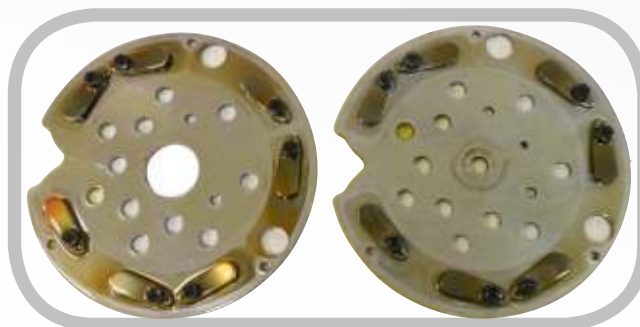
Both in good condition with no abnormalities.

Front and rear gaskets

Both in good condition with no abnormalities.

Valve plates

All valve plates were in excellent working order. There were some minor signs of excessive temperature or pressure during operation, with only some slight blackening on the discharge valve plate. This was most likely caused during periods of the system operating low on refrigerant from the leaking discharge line that was replaced twice during the period of service.



Swashplate

Front nose cone and shaft seal

The front nose cone is in good condition. The shaft seal was the main issue, causing a refrigerant leak. The reason appears to be a small chip/crack in the ceramic ring as shown in the images.



Shaft seal

Conclusion

The major components of the compressor were still in excellent condition for this duration of operation. In particular the pistons, thrust bearings, shoe discs and swashplate are all showing low-to-medium wear factors, and it is concluded that these components – as the working

assembly of the compressor – are capable of further operation in the field. The compressor was only in need of a new shaft seal. With this replaced, and the clutch cleaned or replaced, the compressor is now ready to return to service.



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Other references:

Unicla General Service Information [Cat.No.B0901]

Unicla Compressor Selection Criteria [Cat.No.B0902]