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SPECIFICATION

DRY AIR	Up to 25 litres / minute at less than -60°C dewpoint
DIMENSIONS	Width: 660mm Depth: 300mm Height: 420mm (incl. feet)
WEIGHT	41.5 kg
POWER	Specified at time of purchase: 220-240V ac, 50 Hz, 5A or 100-115V ac, 50/60 Hz, 11A

INTRODUCTION

The AD41 is a development of the AD31 Dry Air Unit that has seen a total service life of more than one million hours. The new benefits are:

QUIETER RUNNING

Brand new casing that incorporates extra soundproofing and a more convoluted cooling air path to reduce the operating noise level.

REDUCED MAINTENANCE

By building in larger filters it has been possible to achieve longer service intervals. An integral hourmeter gives an instant and accurate indication of total runtime. When service is needed the components are quick and easy to access.

ENHANCED FUNCTIONALITY

The AD41 now features a dedicated microcontroller to give long term accuracy of the timing cycles, comprehensive status indication at all times and automatic stall-free restart after a power failure.

REMOTE OPERATION

With an optional Remote Control Module, the AD41 may be situated up to 60 metres away from point of use of the dry air. The Remote Control Module indicates the operational status, dry air flowrate and allows the AD41 on/off to be controlled.

Alternatively, the EXT port can be used to control or monitor the AD41 from other equipment.

MODE OF OPERATION

This stand-alone unit, draws in atmospheric air and converts it to dry air. The dry air has a dewpoint of better than -60°C and a variable flowrate up to a maximum of 25 litres/minute.

The AD41 Flow Scheme (Fig 1) shows the air is compressed to 3.5 bar pressure and passed, via a particle filter, to a factory-sealed, twin-column pressure-swing adsorption dryer. An oil-free compressor is employed to avoid contamination of the molecular sieve drying agent by lubricating oil.

At any one time, pressurised air is dried by passing it up one of the columns. Simultaneously, a fraction of this dry air is bled back down the other column at low pressure to purge it of water vapour. After a pre-set time, the action of the two columns is reversed by means of electrically operated change over valves.

The pressurised dry air passes through a filter/regulator to remove pressure pulses during column switching and limit the maximum output pressure. The output flowrate is controlled by the user with a built-in needle valve and flowmeter.

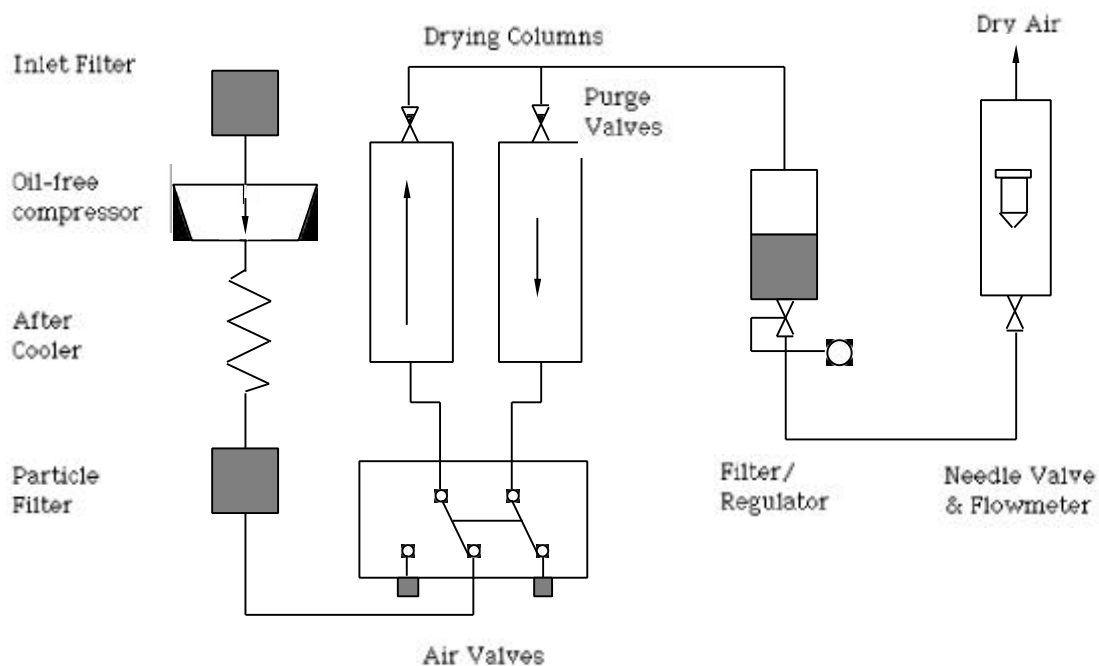


Fig 1 AD41 Flow Scheme

USING THE AD41

If the AD41 has not been used for some time it is advisable to run the unit overnight to establish the correct moisture gradient within the drying columns. This should be done before connecting any moisture-sensitive equipment to the DRY AIR output.

To avoid overheating, the AD41 should be located away from sources of heat and in a position where it can draw a supply of cool air through the high level inlet at the end of the quiet box. DO NOT OBSTRUCT THE COOLING AIR GRILLS AT EACH END OF THE UNIT.

1. Connect the DRY AIR output to your equipment using 8mm OD nylon tube to minimise pressure drop in the connecting tube. In Cryostream Cooler applications use the reducing coupling supplied to connect 8mm tube to 6mm tube: the total length of 6mm OD tube should be limited to 3 metres.
2. To obtain dry air, connect the AD41 to the appropriate electricity supply - the POWER lamp should light.
3. Switch on the AD41. At this point, the RUN lamp should flash for 4 seconds after which you will hear the compressor start and the RUN lamp will light continuously.
4. Set the required dry air flowrate with the needle valve on the flowmeter. When using the AD41 with the Cryostream Cooler, use between five and ten litres per minute.

Note: As the AD41 warms up from cold the flowrate may require adjusting. Once the unit is warm the flowrate will stay constant.

REMOTE OPERATION

In certain circumstances it may not be convenient to have the AD41 in the room where the dry air is being used. In this case, the AD41 may be located in another room.

An optional Remote Control Module is available to control and monitor the AD41 at the point of use of dry air. The Remote unit duplicates the valved flowmeter, ON/OFF switch and the POWER, RUN & FAULT lamps. The practical limit to the distance between the AD41 and the Remote Control Module is 60 metres.

Note: When the Remote Control Module is installed the ON/OFF switch on the AD41 acts as a master switch and must be set to ON to allow the remote ON/OFF switch to function.

Consult APPENDIX 5 - REMOTE CONTROL MODULE for installation details of the Remote option.

MAINTENANCE AND TROUBLE SHOOTING

The AD41 is designed to be a low-maintenance unit. A useful indication that the unit is functioning correctly is that a brief hiss can be heard at regular (one minute) intervals as the air valves switch the action of the columns.

When the AD41 is used with the Cryostream Cooler to provide the dry air shield for the nitrogen gas stream, a deterioration in the dryness of the dry air will show up as frost forming evenly all around the cold nitrogen stream delivery nozzle.

PRECAUTIONS

If you have not used the AD41 for some time it may be necessary to run the unit overnight to dry down the columns.

ROUTINE MAINTENANCE

The AD41 is designed to run for 9,000 hours before needing any maintenance. However, local conditions may accelerate wear of components or clogging of filters. Routine or preventative maintenance may be carried out by users, utilising a qualified technician. The following items may require attention.

Compressor Delivery Filter

Eventually the Compressor Delivery Filter will become clogged with the finer particles of room dirt and the wear products from the compressor. The symptoms will be a deterioration in the dryness of the dry air and, as the blockage gets worse, a reduction in the maximum dry air flowrate.

For details of the filter replacement see Appendix 3.

Compressor

At some stage (usually longer than 9,000 hours) the plastic piston ring in the compressor will wear out. The eventual failure of the piston seal is a very sudden process and the dryness of the dry air will deteriorate rapidly, also the maximum flowrate of dry air will drop below 25 litres/minute (perhaps less than 10 litres/minute).

This situation requires the compressor to be serviced. See Appendix 4.

CHECKING THE DRY AIR OUTPUT

Note: Make sure to run the AD41 overnight before checking the dry air output, this will give the drying columns a chance to dry down.

The residual water vapour content of the AD41 dry air output may be measured with a suitable hygrometer calibrated down to -70°C dewpoint. Allow at least 10 minutes for the reading to reach equilibrium.

FAULTS

Note: If any trips are activated the cause should be determined, preferably by a qualified technician, before restarting the unit.

A rear panel fuse (1A, 220-240V or 2A, 100-115V) protects the transformer that drives the power supply, control board, indicator lamps, cooling fan and solenoid valves.

A rear panel circuit breaker operates if the compressor draws excessive current - push the black button in to reset.

A manual reset thermal switch operates if the temperature inside the quiet box rises excessively for any reason. If an overheat occurs the **HOT!** lamp will flash until the thermal switch is reset. The thermal switch is mounted in the compressor compartment (see Fig 4 (M)) - press the red button to reset.

FACTORY OVERHAUL/SERVICE

After extended running you may consider it desirable for the AD41 to have a complete factory service and full recommissioning procedure. Please contact your agent or Oxford Cryosystems to discuss this type of service if required.

LIST OF APPENDICES

APPENDIX 1	General Circuit Diagram
APPENDIX 2	Control Board Circuit Diagram
APPENDIX 3	Compressor Delivery Filter Replacement
APPENDIX 4	Compressor Service

APPENDIX 1 - GENERAL CIRCUIT DIAGRAM

APPENDIX 2 - CONTROL BOARD CIRCUIT DIAGRAM

APPENDIX 3 - COMPRESSOR DELIVERY FILTER REPLACEMENT

Refer to Fig 4 Page 13

1. Switch off the AD41 and disconnect the electrical power.
2. Remove the AD41 top cover by lifting the four white plastic plugs and unscrewing the four M5 socket caphead screws with the 4mmA/F hexagon balldriver provided.
3. The Compressor Delivery Filter (A) is a square grey unit mounted just under the top cover near the control panel end of the AD41. Unscrew the four M6 socket caphead screws on the lid of the filter with the 5mmA/F hexagon key provided.
4. Lift off the lid and disconnect the 8mm nylon tube if necessary. Lift out the top anodised aluminium mesh (B), the filter disc (C) and the bottom anodised aluminium mesh (B).
5. Discard the dirty filter disc and clean the meshes.
6. Clean the sealing 'O' ring on the lid and the part of the body on which it seals.
7. Fit one mesh into the filter body, lay a new filter disc on top of the mesh with an equal overlap all round and fit the second mesh on top. Re-connect the 8mm nylon tube, replace the filter lid and tighten down the four M6 socket caphead screws evenly in sequence.
8. Run the AD41 overnight to dry down the columns.

APPENDIX 4 - COMPRESSOR SERVICE

Note: This work should be carried out by a qualified mechanical and electrical technician.

These instructions are for use with an AD41 Compressor Service Kit comprising:-

1. One piston/cylinder assembly
2. One relief/dump valve
3. One inlet filter unit
4. One delivery filter disc

DISMANTLING

Please refer to Fig 4 Page 13.

1. Switch off the AD41 and disconnect the electrical power and the dry air output.
2. Remove the AD41 top cover by lifting the four white plastic plugs and unscrewing the four M5 socket caphead screws with the 4mmA/F hexagon balldriver provided.
3. Disconnect the blue compressor delivery hose coupling (P) at the brass fitting on the compressor. Disconnect the compressor power cable (Q) at the plug-in connector (the plug may be held in place with a cable tie).
4. Unscrew the four nuts (R) (in recesses underneath the cabinet) securing the compressor rubber mounts to the base of the cabinet. **NOTE THE POSITION OF ALL WASHERS AND LOCK WASHERS.** Carefully lift the compressor out of the quiet box.

COMPRESSOR

Please refer to Fig 5 Page 14.

1. Remove the inlet filter cannister (S) which should unscrew by hand from the brass fitting on the compressor.
2. Remove the cylindrical brass relief/dump valve (T) (use a thin spanner) - unscrew the complete valve assembly leaving just the elbow fitting screwed into the cylinder head.
3. Make alignment marks with a marker pen on the compressor cylinder head (U), valve plate (V) and body to enable correct re-assembly.
4. Remove the cylinder head (U) and valve plate (V) (six screws).
5. Remove the plastic grill (W) from the front of the crankcase (four screws) and the plastic fan (X) (one screw and two washers.) - **NOTE THE CORRECT ORIENTATION OF THE FAN ON THE END OF THE MOTOR SHAFT.**

6. Release the piston connecting rod clamp screw (Y) (socket caphead screw accessed through a hole in the side of the crankcase) and remove the worn piston and cylinder - **NOTE THE ALIGNMENT OF THE PISTON ASSEMBLY ON THE BEARING.** Check the motor bearings and especially the big end bearing for wear which may cause premature failure.
7. Fit the new piston and cylinder (Z) (use the original clamp screw (Y) with thread locking compound).
8. Refit the valve plate and cylinder head (tighten opposing screws in sequence to avoid distorting the cylinder head).
9. Refit the plastic fan (X) (using the screw, spring washer and plain washer with thread locking compound). Refit the plastic grill (W) (check that none of the cables which have been disturbed touches the fan or other moving parts).
10. Fit the new compressor relief/dump valve (T) and bonded sealing washer using a thin spanner (ensure that the new valve is supplied "pre-set - ready to use"). **TAKE CARE NOT TO ALTER THE SETTING OF THE RELIEF/DUMP VALVE.**
11. Fit the new inlet filter (S) firmly by hand.

ASSEMBLY

Please refer to Fig 4 Page 13.

1. Refit the compressor into the cabinet (replace all nuts and washers correctly) - do **not** allow the compressor rubber mounts to rotate as the securing nuts are being tightened.
2. Reconnect the blue compressor delivery hose coupling (P) at the brass fitting on the compressor and reconnect the compressor power cable (Q) at the plug in connection.
3. Fit a new element in the delivery filter (as described in Appendix 3).
4. Fit the top cover securing screws and plastic plugs.

DRYING DOWN

After a service the drying columns are likely to be wet. Run the AD41 for at least 24 hours to dry the columns down before using the AD41 as a dry air supply.

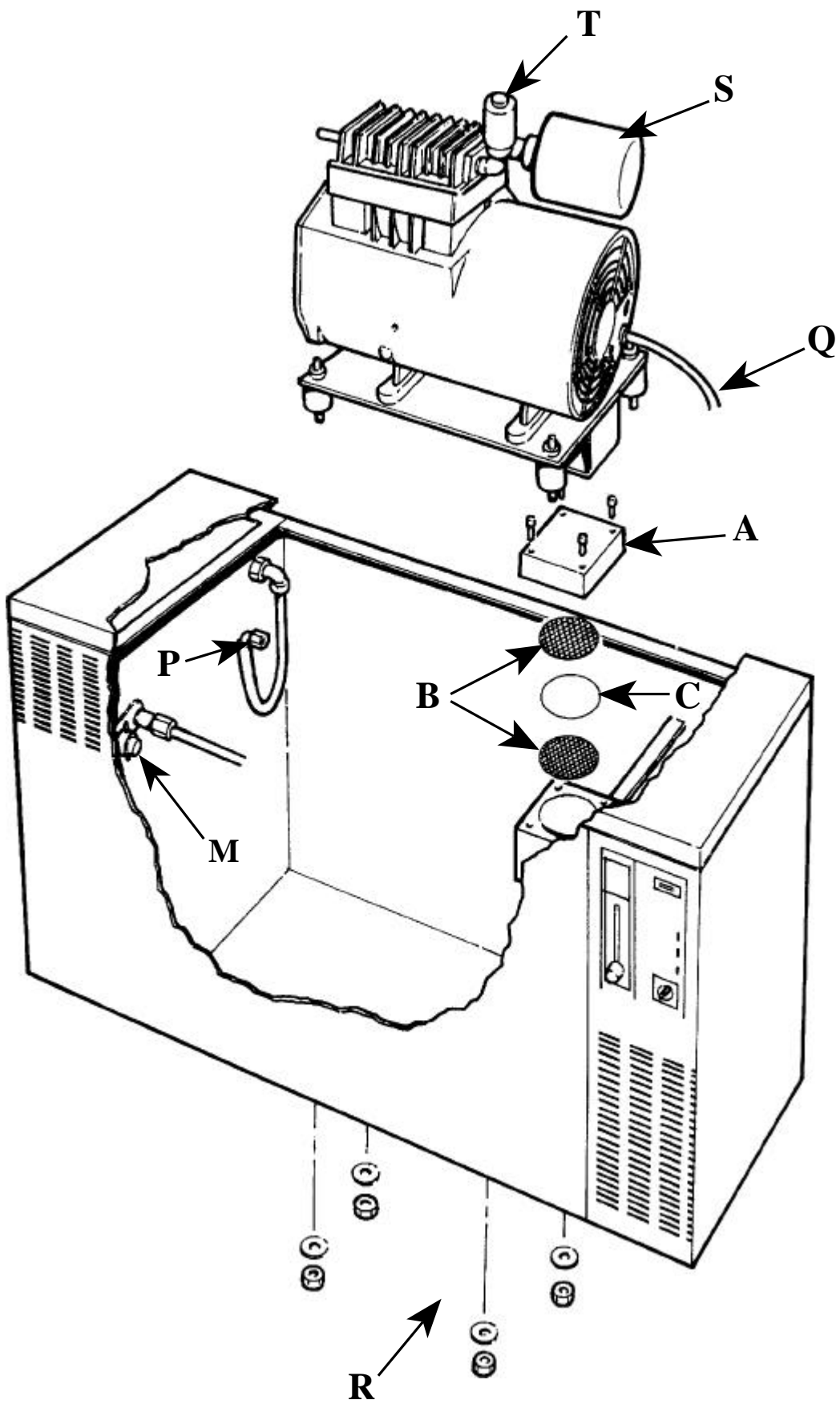


Fig 4

AD41 Filter Replacement

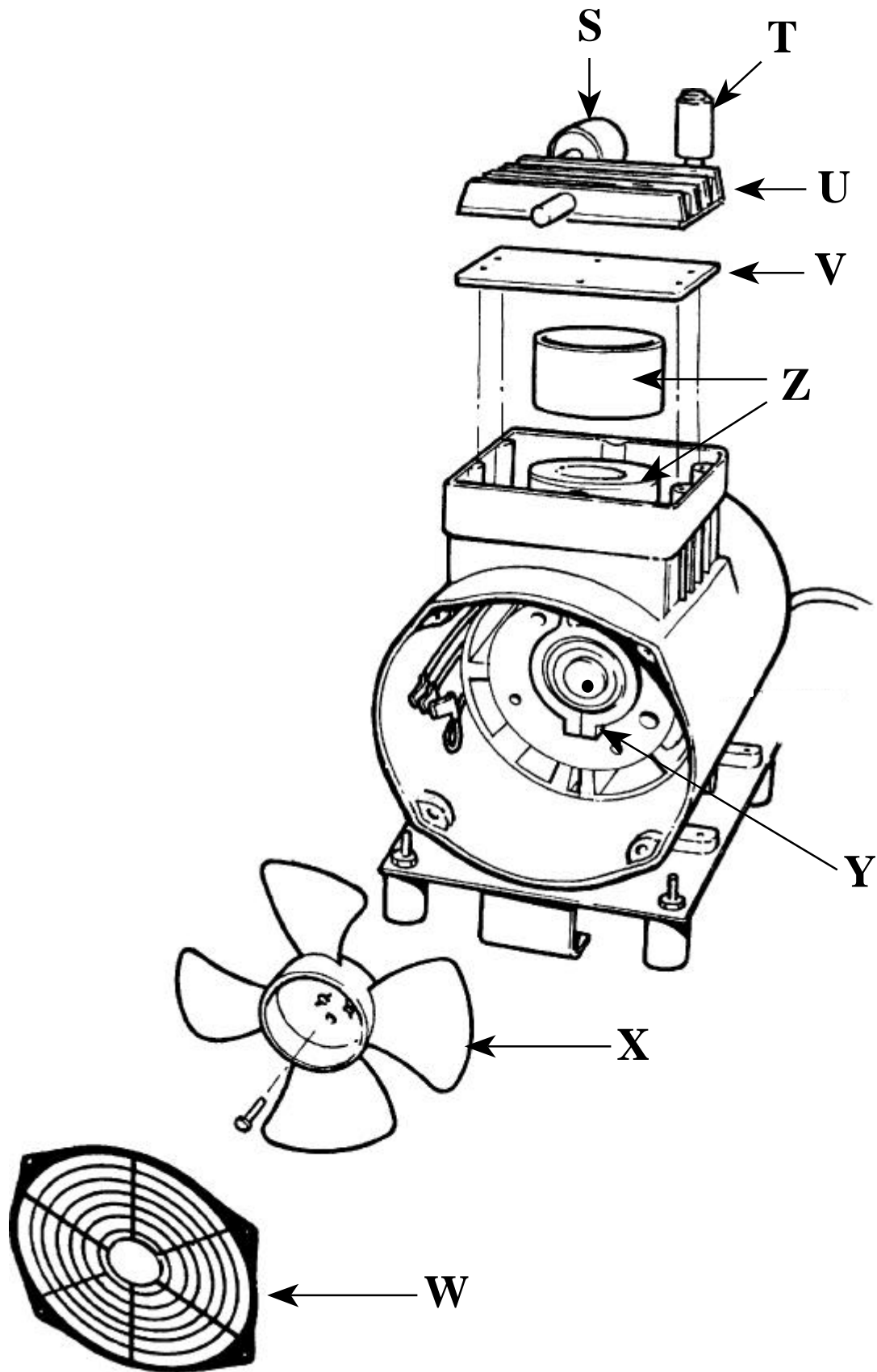


Fig 5 AD41 Compressor Service