

TURBO-TRACE

COMPONENT TRACKING PROGRAM

PROBLEM: Gas turbine components often have finite lives. They must be replaced within recommended intervals or failure could result. These components (most commonly turbine blades, stator vanes, combustor hardware) are very expensive and are often refurbished. The refurbishment may or may not recover the full life of the part.

The large number of replaceable parts (up to 800 in some turbines) can be difficult to inventory and track to ensure that no parts exceed their recommended operation interval before replacement. Manual tracking of the histories of these parts is labourious and time consuming. Errors and oversights can occur, and personnel changes can result in a serious loss of continuity.

SOLUTION: This tracking program allows inventory control, operation history and repair history to be easily available to rotating equipment engineers, purchasers and inventory control staff. A database template has been developed with forms and reports that have been carefully designed to meet the needs of gas turbine operations and maintenance personnel. Customizing is available to meet specialized user needs. Experienced programmers working with gas turbine reliability engineers ensure that the users' requirements will be met.

Once the initial data input has been achieved, minimal manual input of data is required. Global commands allow whole sets or selected groups of parts to be grouped, moved from location to location, annotated or flagged. Time in service is automatically accounted for to provide operating hours and other critical operating information. Individual part histories can be retrieved with ease.

Assistance with custom requirements, data input and ongoing support is readily available. Or, let us contract to manage your part tracking requirements using our experienced, skilled team.

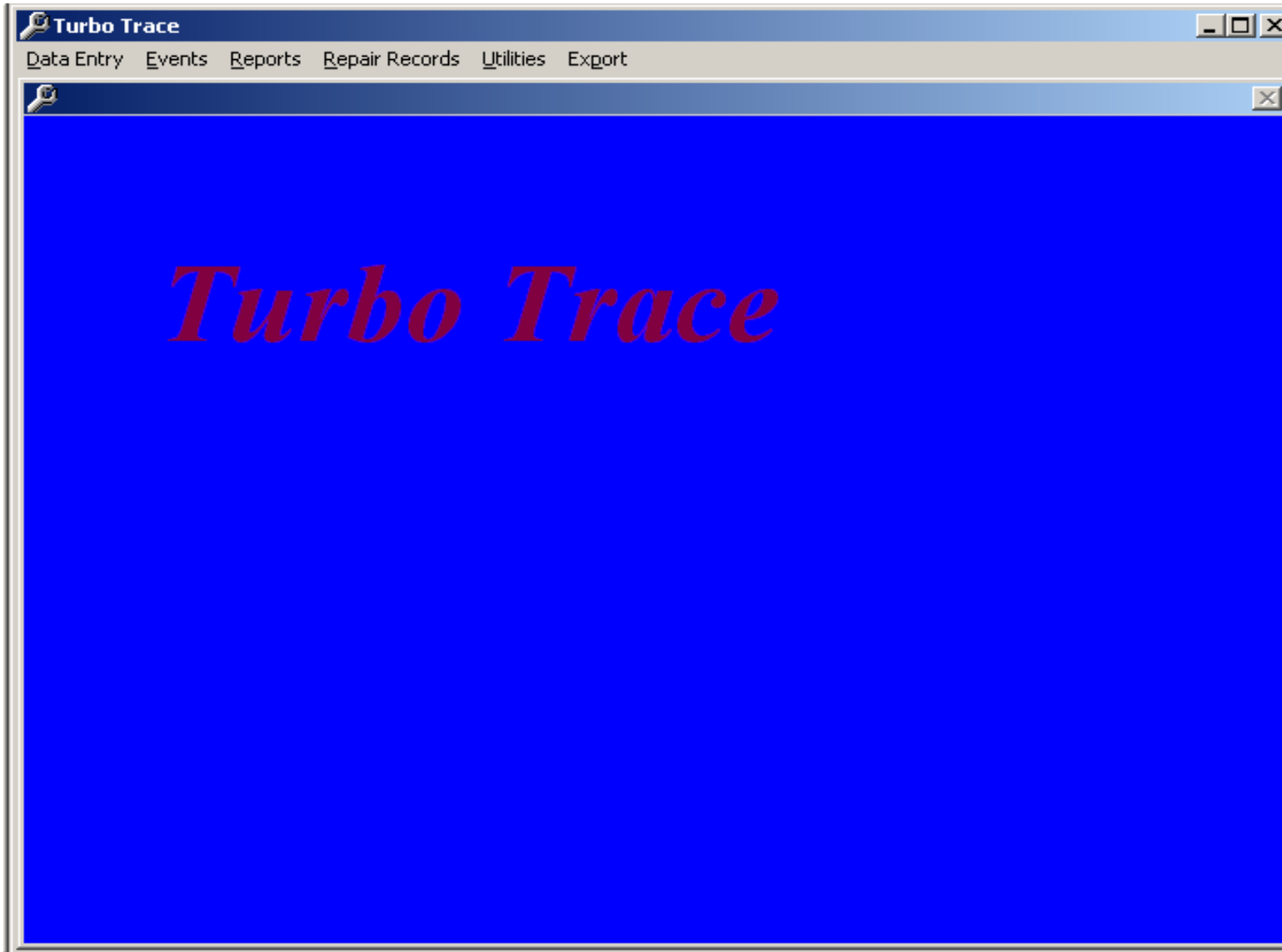
For more information or a demonstration, contact us today at:

BWD TURBINES LIMITED

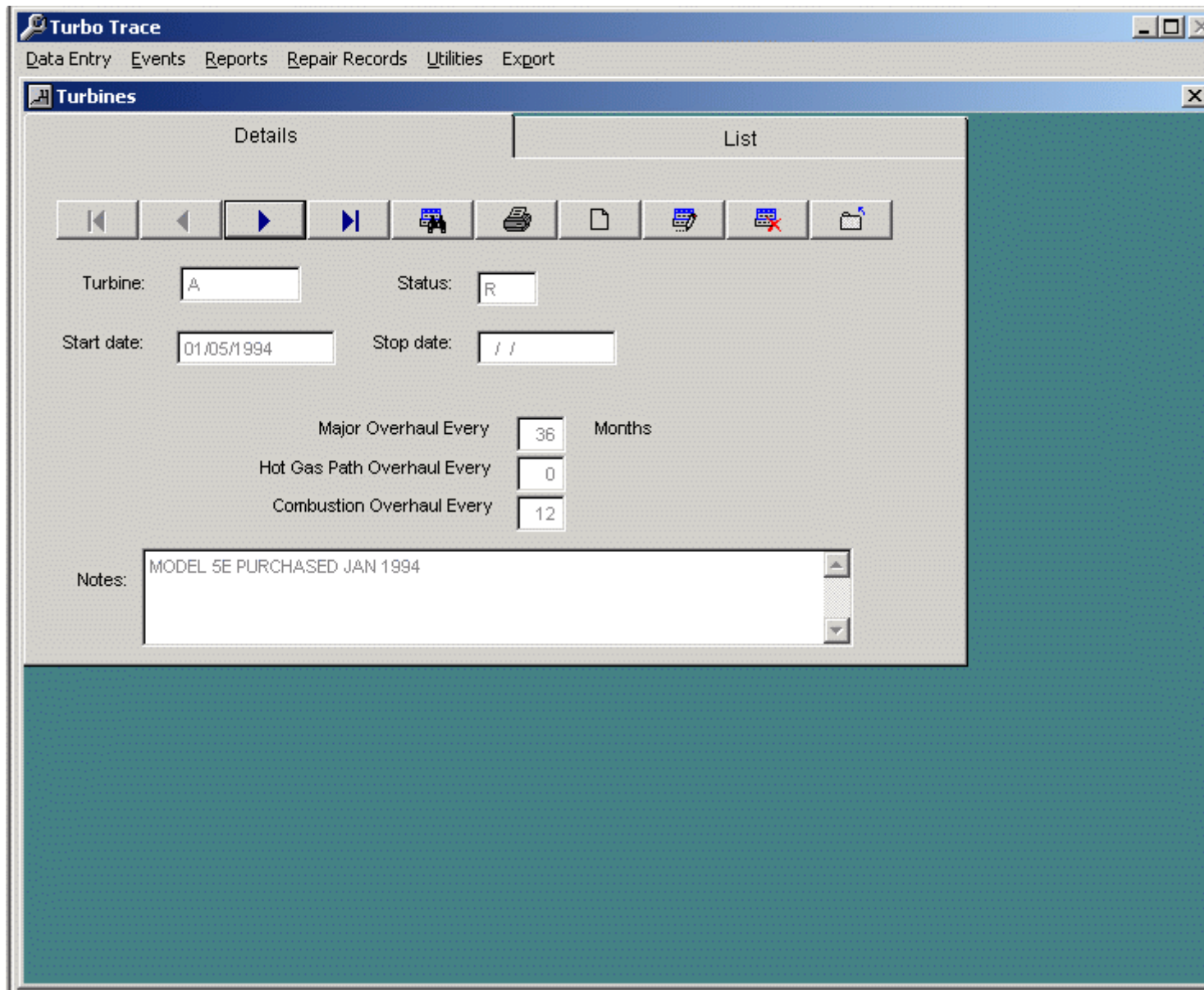
ADVANCED TURBINE TECHNOLOGIES FOR THE INDUSTRY WORLDWIDE

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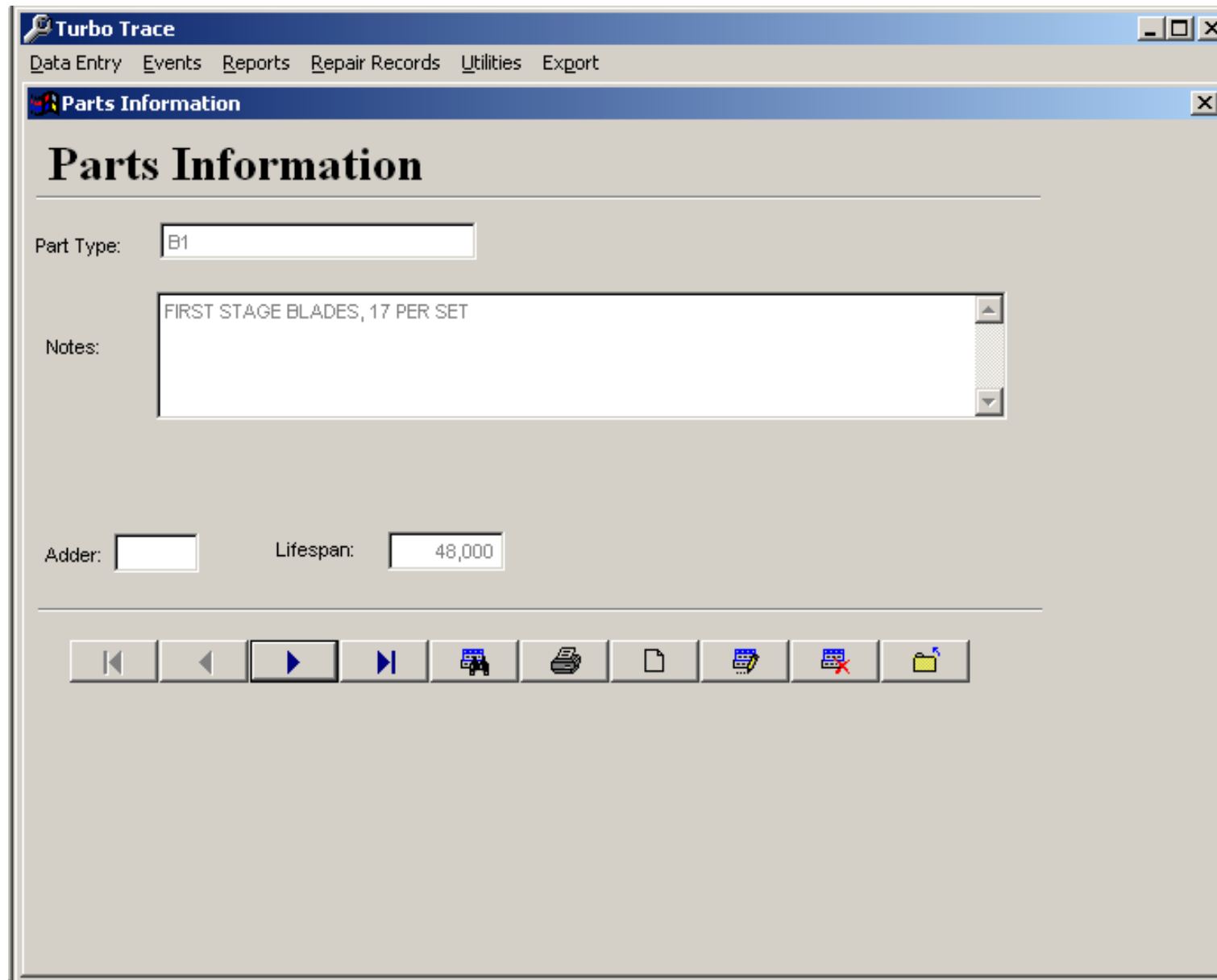
PHONE: 905-648-9262
FAX: 905-648-9264
Web Site: www.bwdturbines.com



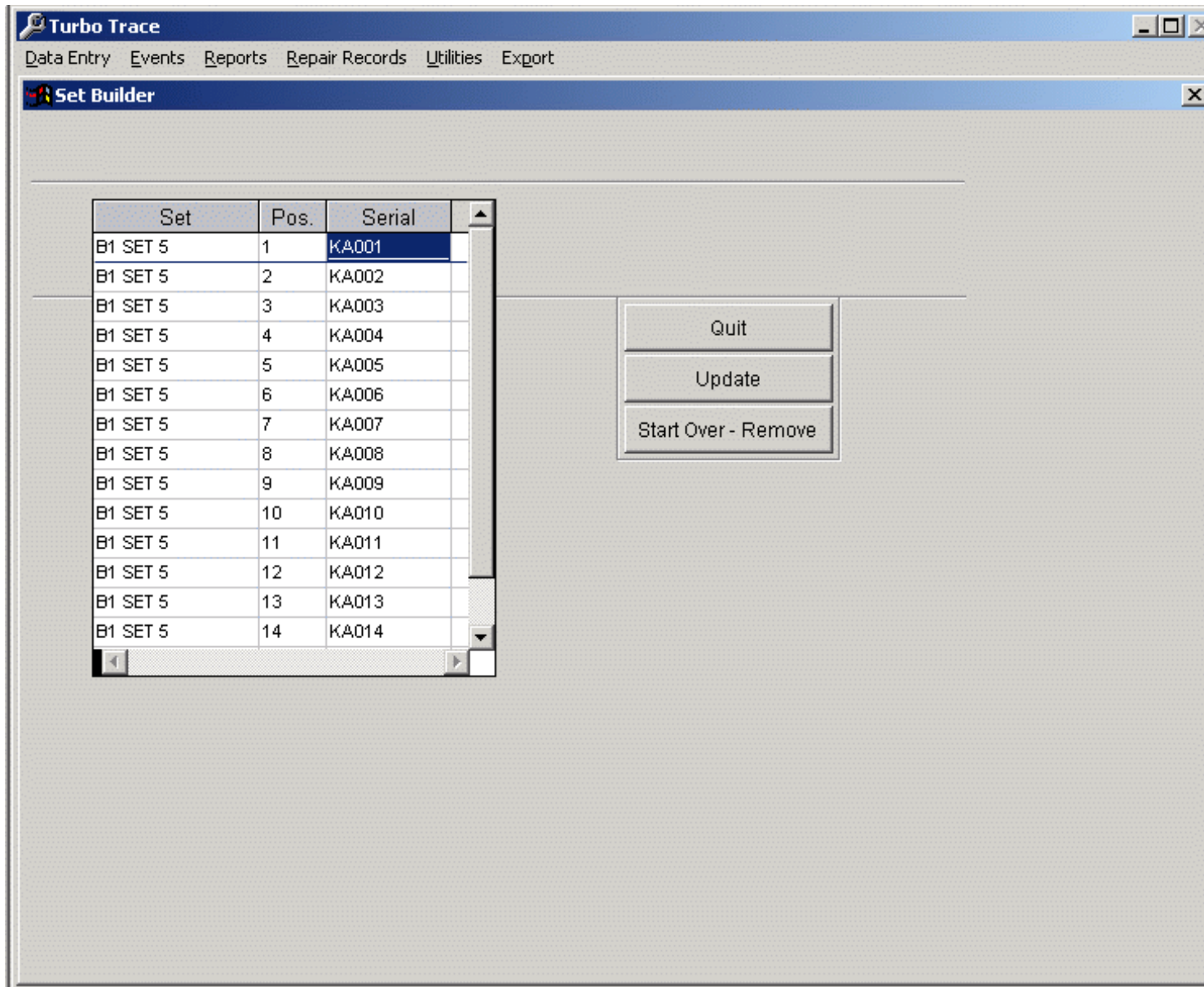
TurboTrace maintains a database of location, operating and repair history, and current operating hours for every component in your fleet by component serial number.



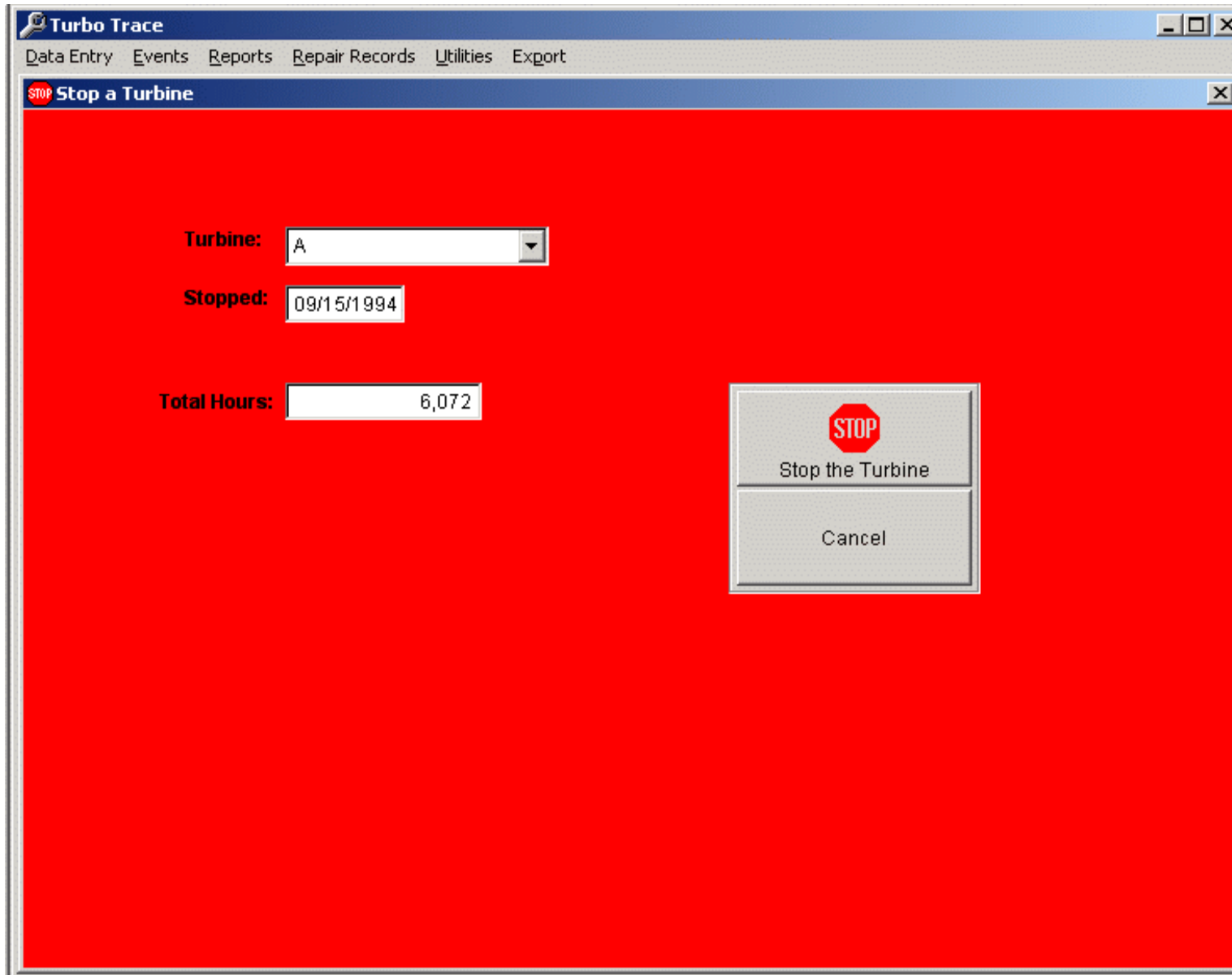
Enter data for all of the turbines in your fleet, including a location for spare parts and scrap parts.



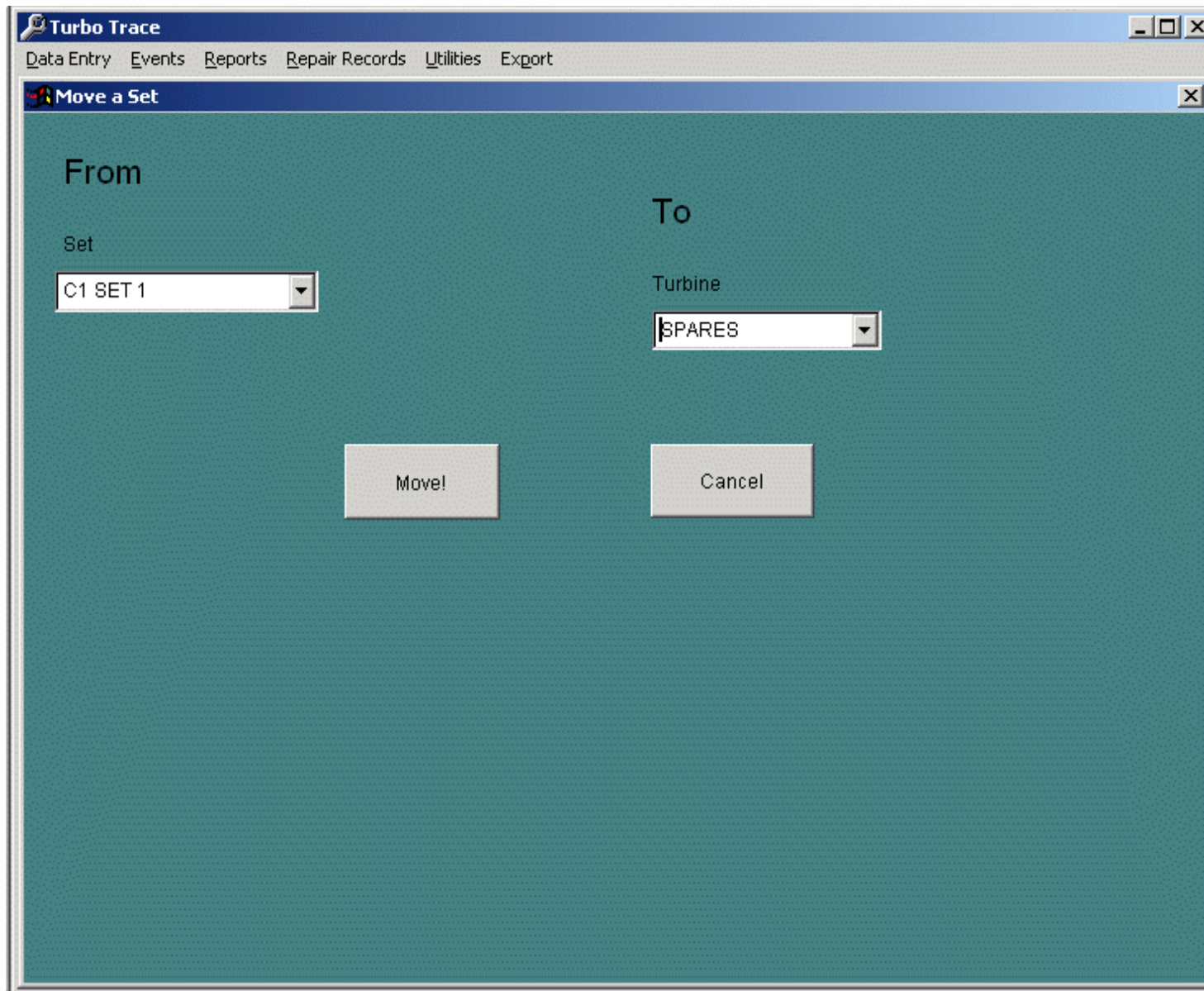
Enter labels and common data for all part types.



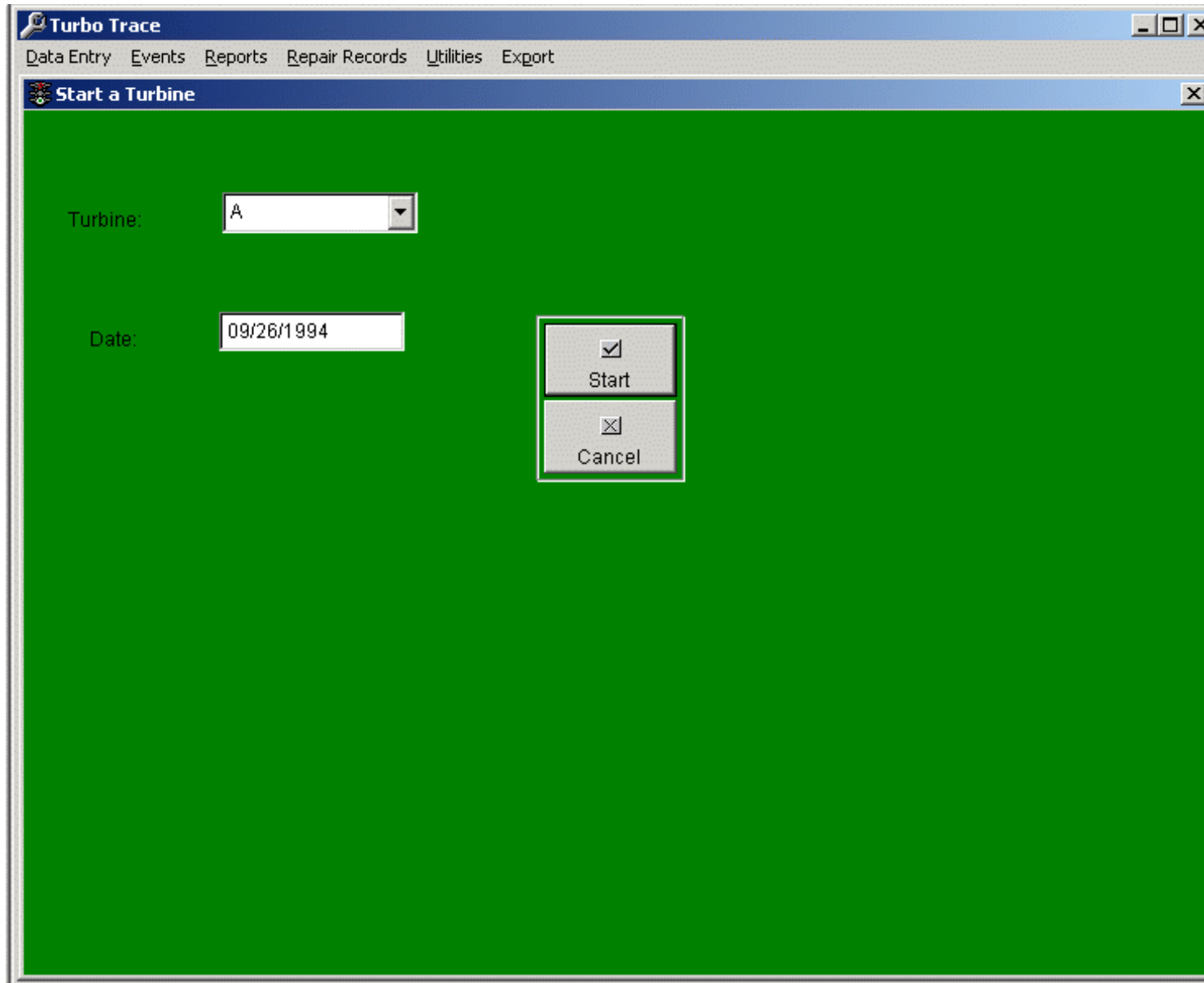
Identify sets of parts and enter the serial numbers for each part.



Stop a Turbine.



Exchange parts between the stopped turbine and the spares location.



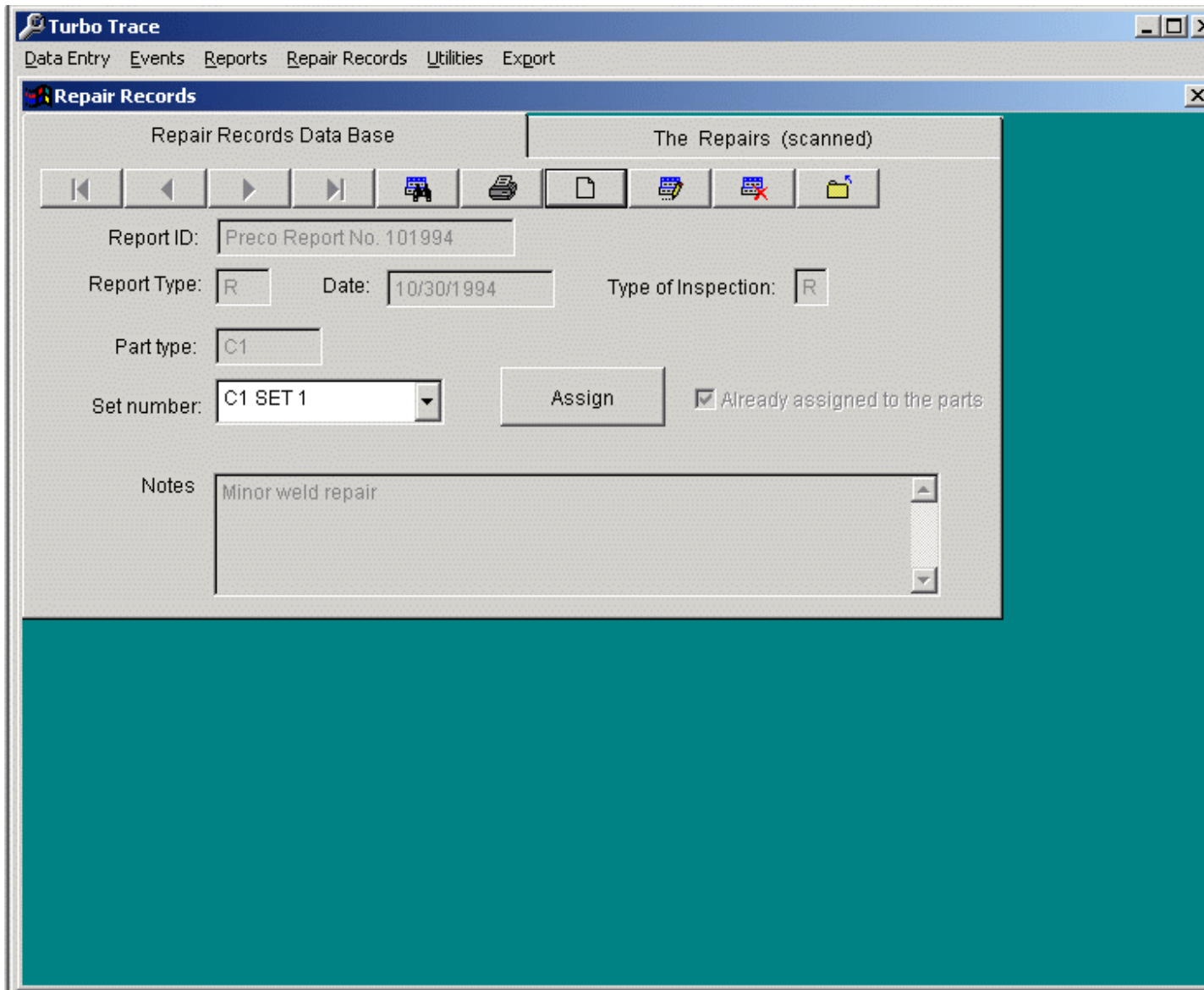
Start the turbine after exchanging parts.

The screenshot shows the Turbo Trace software interface. The main window is titled "Turbo Trace" and has a menu bar with "Data Entry", "Events", "Reports", "Repair Records", "Utilities", and "Export". Below the menu bar is a sub-window titled "Turbine Repair Records".

The sub-window has two tabs: "Repair Records Data Base" and "The Repairs (scanned)". Below the tabs is a toolbar with icons for navigation and file operations. The form contains the following fields and controls:

- Report ID: UNIT A OUTAGE REPORT 09/1994
- Report Type: O
- Date: 09/24/1994
- Inspection Type: C
- Turbine: A
- Assign button
- Already assigned to the parts
- Notes: Combustor set 1 changed out, set 3 installed. No damage observed.

Complete the outage report screen. All parts in the turbine are tagged with this report identification.



Document the repairs to the removed components in the repair report screen. All parts in the set are tagged with the report ID.

Assembly Parts w History - R&R Xbase

Set History Report Set: C1 SET 1
Printed: 02/21/2001

| Position | Turbine | Hours Prior to Start | Hours | Total | Start Date | Stop Date | Repaired By | Repair Type | Coat Type |
|---------------------------------------|---------|----------------------|-------|-------|------------|------------|-------------|-------------|-----------|
| Serial: L001 | | | | | | | | | |
| Notes: | | | | | | | | | |
| 1 | SPARES | 0 | 6072 | 6,072 | 01/05/1994 | 09/15/1994 | | | |
| 1 | A | 0 | 6072 | 6,072 | 01/05/1994 | 09/15/1994 | | | |
| Repairs: 10/30/1994 Minor weld repair | | | | | | | | | |
| Serial: L002 | | | | | | | | | |
| Notes: | | | | | | | | | |
| 2 | SPARES | 0 | 6072 | 6,072 | 01/05/1994 | 09/15/1994 | | | |
| 2 | A | 0 | 6072 | 6,072 | 01/05/1994 | 09/15/1994 | | | |
| Repairs: 10/30/1994 Minor weld repair | | | | | | | | | |
| Serial: L003 | | | | | | | | | |
| Notes: | | | | | | | | | |
| 3 | SPARES | 0 | 6072 | 6,072 | 01/05/1994 | 09/15/1994 | | | |
| 3 | A | 0 | 6072 | 6,072 | 01/05/1994 | 09/15/1994 | | | |
| Repairs: 10/30/1994 Minor weld repair | | | | | | | | | |
| Serial: L004 | | | | | | | | | |

Records Read: 8 Selected: 8 Page: 1 NUM

Print the history of any set of parts, identify all of the parts in any turbine and their current operating hours, etc.

Microsoft Excel - QUERY.DBF

File Edit View Insert Format Tools Data Window Help

C7 = 3

| | A | B | C | D | E | I | J | K | L | M |
|----|-------|--------|----------|-----------|--------|-----------|-----------|----------|-----------|---------|
| 1 | GENNO | PARTNO | POSITION | COMPONENT | SERIAL | STARTDT | STOPDT | ACTHOURS | CALCHOURS | BEG_HRS |
| 2 | A | B1 | 1 | B1 SET 1 | K001 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 3 | A | B1 | 1 | B1 SET 1 | K001 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 4 | A | B1 | 2 | B1 SET 1 | K002 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 5 | A | B1 | 2 | B1 SET 1 | K002 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 6 | A | B1 | 3 | B1 SET 1 | K003 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 7 | A | B1 | 3 | B1 SET 1 | K003 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 8 | A | B1 | 4 | B1 SET 1 | K004 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 9 | A | B1 | 4 | B1 SET 1 | K004 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 10 | A | B1 | 5 | B1 SET 1 | K005 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 11 | A | B1 | 5 | B1 SET 1 | K005 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 12 | A | B1 | 6 | B1 SET 1 | K006 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 13 | A | B1 | 6 | B1 SET 1 | K006 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 14 | A | B1 | 7 | B1 SET 1 | K007 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 15 | A | B1 | 7 | B1 SET 1 | K007 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 16 | A | B1 | 8 | B1 SET 1 | K008 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 17 | A | B1 | 8 | B1 SET 1 | K008 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 18 | A | B1 | 9 | B1 SET 1 | K009 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 19 | A | B1 | 9 | B1 SET 1 | K009 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 20 | A | B1 | 10 | B1 SET 1 | K010 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 21 | A | B1 | 10 | B1 SET 1 | K010 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 22 | A | B1 | 11 | B1 SET 1 | K011 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 23 | A | B1 | 11 | B1 SET 1 | K011 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 24 | A | B1 | 12 | B1 SET 1 | K012 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 25 | A | B1 | 12 | B1 SET 1 | K012 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 26 | A | B1 | 13 | B1 SET 1 | K013 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 27 | A | B1 | 13 | B1 SET 1 | K013 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 28 | A | B1 | 14 | B1 SET 1 | K014 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 29 | A | B1 | 14 | B1 SET 1 | K014 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 30 | A | B1 | 15 | B1 SET 1 | K015 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 31 | A | B1 | 15 | B1 SET 1 | K015 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |
| 32 | A | B1 | 16 | B1 SET 1 | K016 | 1/5/1994 | 9/15/1994 | 6072 | 6072 | 0 |
| 33 | A | B1 | 16 | B1 SET 1 | K016 | 9/26/1994 | 2/22/2001 | 0 | 0 | 6072 |

Ready NUM

Export the current database to MS Excel, Lotus or Access for further manipulation. A Read-Only viewer is also available that can create reports and export the database but does not allow updates.