



| QTY. | PART NUMBER                          |
|------|--------------------------------------|
| 1    | 01-38-00-1-01-CRANKCASE              |
| 1    | 01-38-00-1-02-FRONT BEARING PLATE    |
| 1    | 01-38-00-1-03-REAR BEARING PLATE     |
| 4    | 01-38-00-1-04-CYLINDER               |
| 1    | 01-38-00-1-05-VALVE BLOCK            |
| 1    | 01-38-00-1-06-PORT BLOCK-RIGHT       |
| 1    | 01-38-00-1-07-PORT BLOCK-LEFT        |
| 4    | 01-38-00-1-08-AIR SUPPLY PIPE        |
| 1    | 01-38-00-2-01-CRANKSHAFT             |
| 4    | 01-38-00-2-02-CON-ROD                |
| 4    | 01-38-00-2-03-PISTON                 |
| 1    | 01-38-00-2-04-LARGE GEAR WHEEL+VALVE |
| 1    | 01-38-00-2-05-SMALL GEAR WHEEL       |
| 4    | 01-38-00-M3 NUT                      |
| 24   | 01-38-00-M3x12 A-K CYL HEAD SCREW    |
| 4    | 01-38-00-M3x16 A-K CYL HEAD SCREW    |
| 4    | 01-38-00-M3x5 A-K GRUB SCREW         |
| 4    | 01-38-00-M3x6 A-K CYL HEAD SCREW     |
| 15   | 01-38-00-M4 NUT                      |
| 16   | 01-38-00-M4x12 A-K CYL HEAD SCREW    |
| 8    | 01-38-00-M5x10 A-K CYL HEAD SCREW    |
| 2    | 01-38-00-M4x9 A-K GRUB SCREW         |

- OTHER ABBREVIATIONS
- AS = AS SHOWN
  - DP = DEEP
  - DAA= DRILL AFTER ASSEMBLY
  - D&TAA= DRILL AND TAP AFTER ASSEMBLY
  - CF = CLOSE FIT (SIZE FOR SIZE)
  - PF = PRESS FIT
  - PFAA= PRESS FIT AFTER ASSEMBLY
  - PCD = PITCH CIRCLE DIAMETER
  - RM = REAM
  - HEX = HEXACON, 6SIDED
  - CP = COMPRESSED
  - KNL = KNURLED
  - CSK = COUNTERSINK
  - PL = PLACES
  - DWL= DOWEL
  - SPF= SPOTFACE
  - (T)HESOP=(TAPPED)HOLES EQUALLY SPACED ON PCD
  - (T)HESOC=(TAPPED)HOLES EQUALLY SPACED ON CIRCUMFERENCE
  - OD = OUTSIDE DIAMETER
  - ID = INSIDE DIAMETER
  - [SA-xxx]= SUB ASSEMBLY-xxx

- NOTES:
- ALL DRAWINGS ARE IN METRIC MEASUREMENTS
  - ALL ENGINEERING PRACTICES SHALL BE APPLIED WITH REGARDS TO HOLE AND SHAFT TOLERANCES.
  - WHERE SCREWS OR BOLTS ARE USED THE CLEARANCE HOLES SHALL BE APPROXIMATELY 5% TO 8% LARGER THAN THE MATCHING TAPPED HOLE.
  - PREFERABLY ALL TAPPED HOLES AND MATCHING SCREWS AND/OR BOLTS TO BE METRIC FINE (MF)
  - MATERIALS SPECIFIED ON THE DRAWINGS ARE INDICATIVE ONLY. THE BUILDER CAN MAKE HIS/HER OWN MATERIAL CHOICE.
  - ALL CONNECTIONS/JOINTS WHICH HAVE STEAM PRESSURE APPLIED TO IT SHALL BE SILVER/HARD SOLDERED.
  - COMPRESSION SPRINGS ARE DRAWN IN COMPRESSED STATE (CP), UNCOMPRESSED STATE IS APPROX 40% TO 60% LONGER THEN COMPRESSED STATE.
  - WHERE PREFERRED SCREW OR RIVETED CONNECTIONS CAN BE OMITTED AND PARTS CAN BE BONDED TOGETHER BY USING EITHER HIGH STRENGTH GLUE, EPOXY RESIN, OR SOLDER.
  - PARTS WHICH ARE DIRECTLY EXPOSED TO STEAM AND/OR WATER SHOULD BE CONSTRUCTED USING NON-FERROUS OR NON CORROSIVE MATERIAL SUCH AS BRASS, BRONZE, GUNMETAL, STAINLESS STEEL, COPPER OR MONEL.
  - THE ORDER IN WHICH THE PARTS/COMPONENTS ARE MANUFACTURED AND THE MODEL IS ASSEMBLED IS ENTIRELY LEFT TO THE BUILDER/MODEL MAKER.
  - A COLOUR SCHEME FOR THIS PROJECT IS ENTIRELY LEFT UP TO THE MODEL MAKER.
  - THE MANNER IN WHICH THE PARTS/COMPONENTS ARE MANUFACTURED IS ENTIRELY LEFT UP TO THE BUILDER.
  - USE LOCTITE, ON SCREW OR PRESS FIT CONNECTIONS OR SURFACES, WERE DEEMED NECESSARY TO PREVENT PARTS FROM LOOSENING.
  - WASHERS AND/OR SPRINGWASHERS SHALL BE USED WHERE DEEMED NECESSARY.
  - XX. ERRORS AND/OR OMISSIONS MAY OCCUR IN THE DRAWINGS, DO NOT HESITATE TO CONTACT ME SO THAT THE ERRORS/OMISSIONS CAN BE RECTIFIED.

- MATERIAL ABBREVIATIONS:
- ALU = ALUMINIUM
  - HALU= HARD ALUMINIUM
  - BRS = BRASS
  - BRZ = BRONZE OR GUNMETAL (BRZ/GM)
  - CI = CAST IRON
  - CU = COPPER
  - GRA = GRAPHITE
  - MS = MILD STEEL/BRIGHT MILD STEEL
  - SS = SILVER STEEL OR STAINLESS STEEL
  - SPS = SPRING STEEL
  - PEEK= POLYETHER ETHER KETONE
  - SYN = SYNTHETIC MATERIAL SUCH AS VETON, NYLON, TEFLON OR RUBBER
- IN GENERAL SYNTHETIC MATERIALS SHOULD BE ABLE TO WITHSTAND THE HEAT AND PRESSURE(S) APPLIED TO THEM.
- nnn/nnn MEANS THAT EITHER MATERIAL CAN BE USED

ADDITIONAL NOTES ABOUT THIS ENGINE  
 IF ONE WISH TO ADVANCE AND/OR RETARD THE AIR FLOW INTO THE CYLINDERS THAN THE VALVE SHOULD BE ADVANCED/REDARDED IN RELATION TO THE CRANKSHAFT. TO ACHIEVE THIS, ONE SHOULD ROTATE THE SMALL GEARWHEEL EITHER CLOCKWISE OR ANTICLOCKWISE IN RELATION TO THE CRANKSHAFT SO THAT THERE IS A SMALL ANGLE BETWEEN THE MARKS 4 AND 5. THE ANGLE SHOULD BE EXPERIMENTALLY DETERMINED BY THE BUILDER.

NOTES: THE ORIGINAL DRAWINGS WERE GIVEN TO ME. THE ORIGINAL DESIGN AND BUILD WAS BY CHUCK FELLOWS. DRAWINGS WERE DATED DECEMBER 2010. (THIS ENGINE IS 1.5 TIMES LARGER THEN THE ORIGINAL DESIGNED)

TITLE  
**A BOXER TYPE 4 CYLINDER COMPRESSED AIR ENGINE**

DRAWING CONTENTS  
**GENERAL ARRANGEMENT, NOTES, BILL OF MATERIALS, ISOMETRIC VIEW**

PROJECT No 01-38-00  
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PROJECTION  
**JDWDS** MODEL SCALE: 1:1  
 DWG SCALE: 1:1 @A3 OR AS SHOWN  
 DATE MAY 2020 Copyright © J.A.M. DE WAAL PAPAOKURA NZ  
 SHEET: 01 OF 03 **A3** No: 01-38-00-SHT01

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