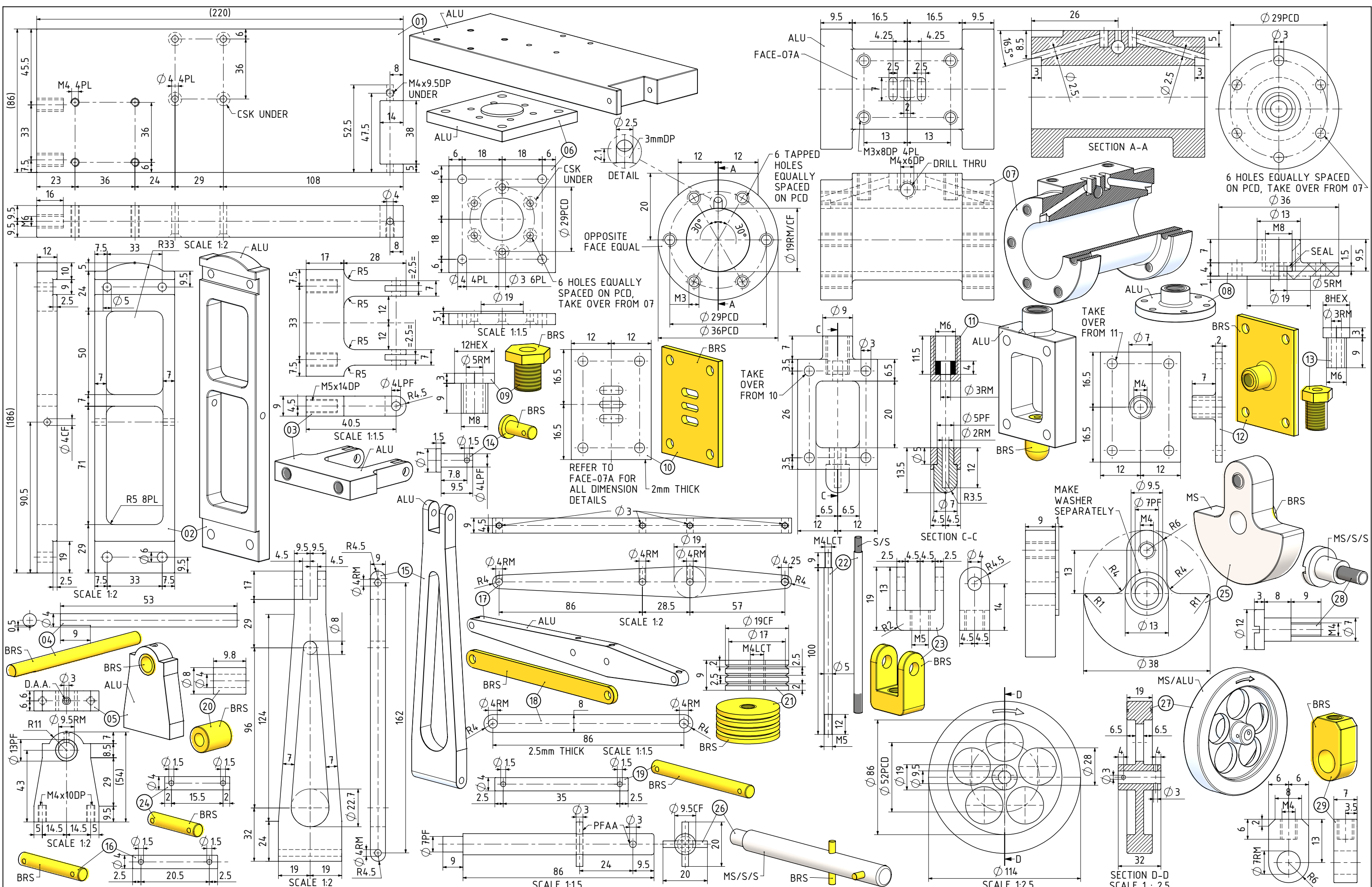


QTY.	PART NUMBER
1	EVG-P37-01-BASE PLATE
1	EVG-P37-02-COLUMN
1	EVG-P37-03-COLUMN FORK
1	EVG-P37-04-LOWER LEG PIN
2	EVG-P37-05-MAIN BEARING
1	EVG-P37-06-CYLINDER LOWER LID
1	EVG-P37-07-CYLINDER
1	EVG-P37-08-CYLINDER TOP COVER
1	EVG-P37-09-PISTON ROD PACK NUT
1	EVG-P37-10-VALVE PORT PLATE
1	EVG-P37-11-VALVE STEAM CHEST
1	EVG-P37-12-VALVE CHEST COVER
1	EVG-P37-13-VALVE ROD PACK NUT
2	EVG-P37-14-FORK PIN
1	EVG-P37-15-MOVING LEG
1	EVG-P37-16-UPPER LEG PIN
1	EVG-P37-17-MAIN BEAM
2	EVG-P37-18-MAIN BEAM LINK
1	EVG-P37-19-MAIN BEAM LINK PIN
2	EVG-P37-20-MAIN BEAM LINK SPACER
1	EVG-P37-21-PISTON
1	EVG-P37-22-PISTON ROD
1	EVG-P37-23-PISTON ROD FORK
2	EVG-P37-24-PISTON ROD FORK PIN
1	EVG-P37-25-CRANK
1	EVG-P37-26-CRANKSHAFT
1	EVG-P37-27-FLYWHEEL
1	EVG-P37-28-CRANK PIN
1	EVG-P37-29-CON-ROD BIG END
1	EVG-P37-30-CON-ROD
1	EVG-P37-31-CON-ROD FORK
1	EVG-P37-32-ECCETRIC SHEAVE
1	EVG-P37-33-ECCENTRIC STRAP
1	EVG-P37-34-ECCENTRIC SPACER
1	EVG-P37-35-VALVE ROD
1	EVG-P37-36-VALVE
1	EVG-P37-37-VALVE NUT
1	EVG-P37-38-VALVE CRANK
1	EVG-P37-39-VALVE FORK
2	EVG-P37-40-STEAM IN-OUT LET PIPE
11	EVG-P37-41-15mm S-TYPE LOCKING PIN
2	EVG-P37-M3x7 GRUB SREW
6	EVG-P37-M3x13 C-SINK SCREW
6	EVG-P37-M3x13 ROUND HEAD SCREW
4	EVG-P37-M3x20 ROUND HEAD SCREW
2	EVG-P37-M4x7 GRUB SREW
4	EVG-P37-M4x22 ROUND HEAD SCREW
4	EVG-P37-M4x25 C-SINK SCREW
2	EVG-P37-M5 NUT
2	EVG-P37-M5x22 ROUND HEAD SCREW
2	EVG-P37-M6x25 ROUND HEAD SCREW



NOTES: THE ORIGINAL DRAWINGS AND ARTICLE OF THIS ENGINE WERE BY ELMER VERBURG AND PUBLISHED IN A BOOK AS CHAPTER 37. THE ORIGINAL DRAWINGS WERE POSTED ON: WWW.JOHN-TOM.COM (THIS ENGINE IS 1.5 TIMES LARGER THAN THE ORIGINAL)

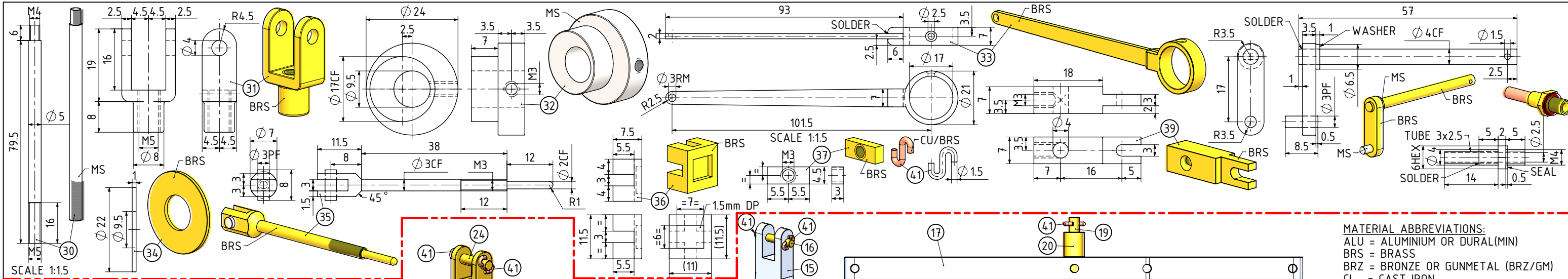
TITLE
1 CYLINDER STEAM ENGINE "GRASSHOPPER" TYPE. (19mm BORE x 26mm STROKE)

DRAWING CONTENTS
PARTS AND ASSEMBLIES

PROJECT No 10-37-00
 JDW DRAUGHTING SERVICES
 J.A.M. DE WAAL, 12 BRIGHTWELL STREET PAPAURA 2110.
 NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000
 E-MAIL: dewaal@xtra.co.nz.

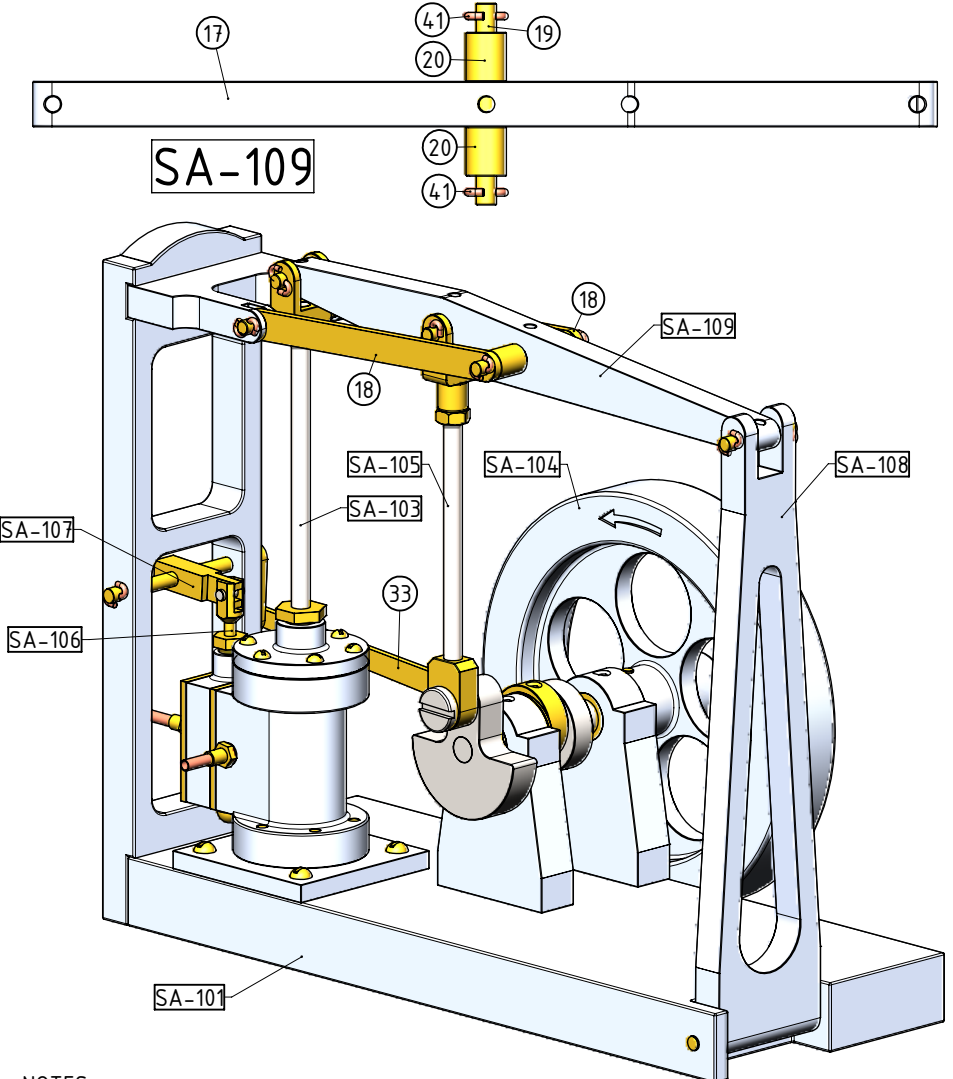
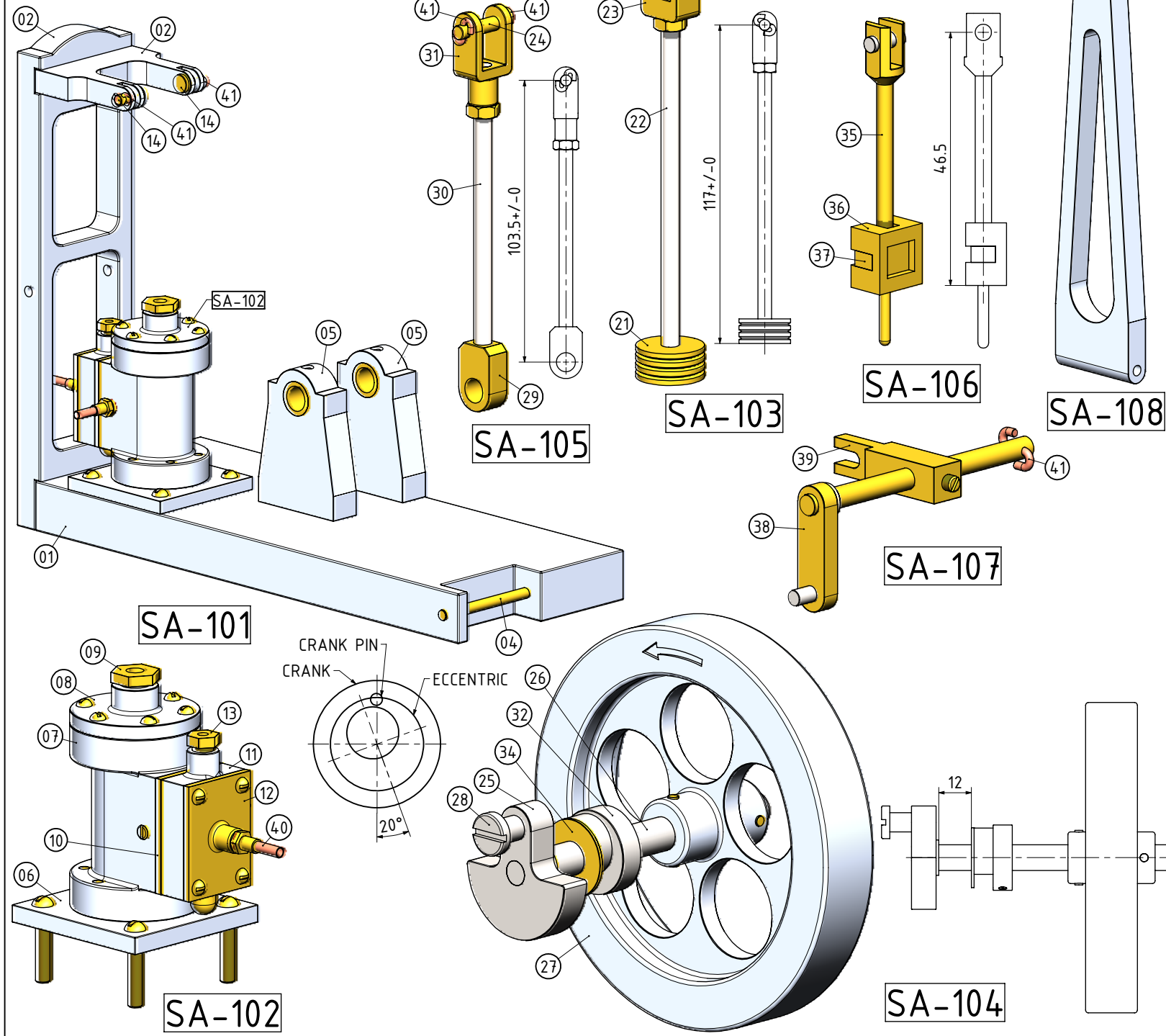
PROJECTION
JDWDS
 DATE: DECEMBER-2015

MODEL SCALE: 1:1
 DWG SCALE: 1:1 @A3 OR AS SHOWN
 Copyright © J.A.M. DE WAAL PAPAURA NZ
 SHEET: 02 OF 03 **A3** No: EVB-P37-02

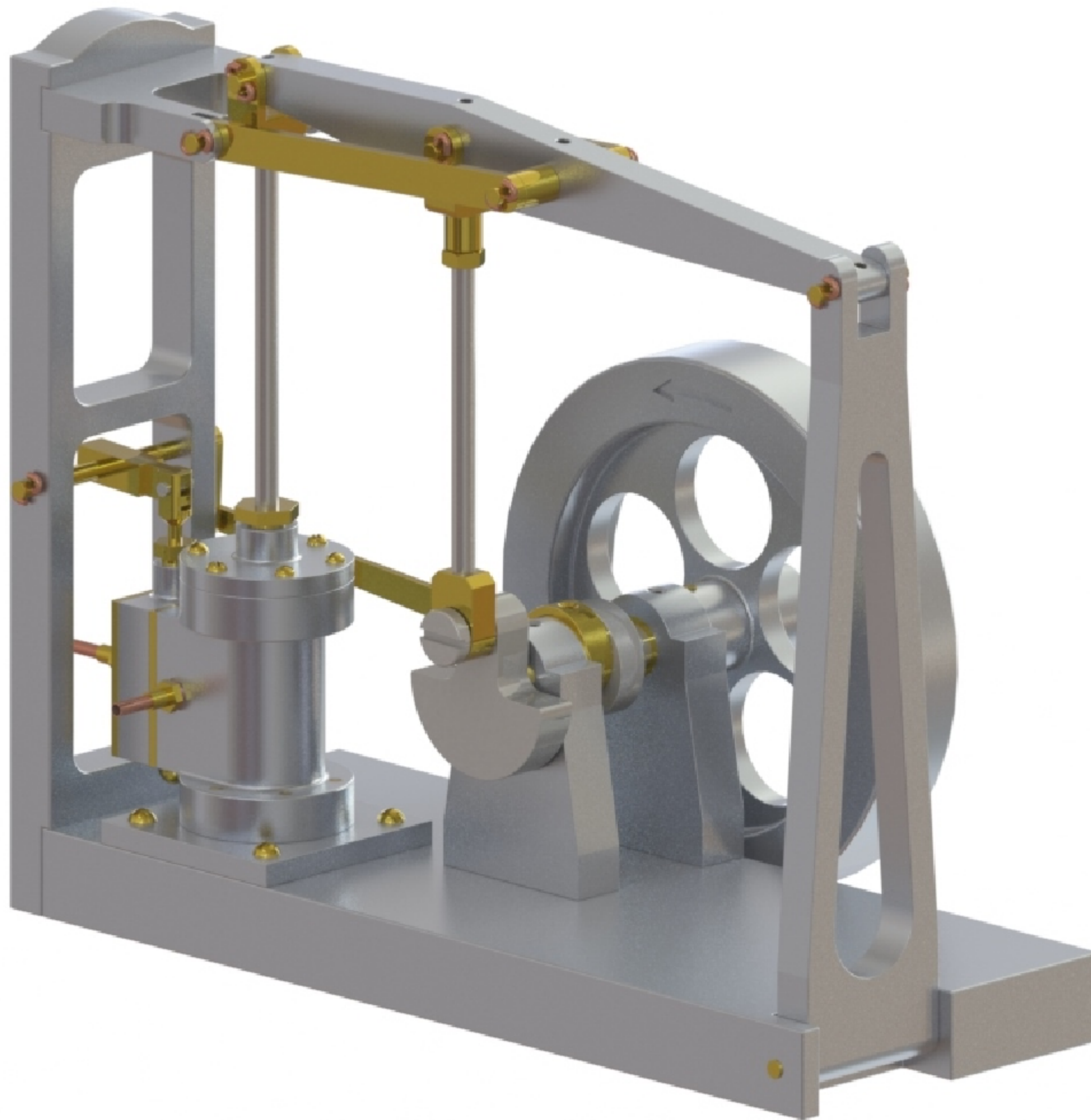


MATERIAL ABBREVIATIONS:
 ALU = ALUMINIUM OR DURAL(MIN)
 BRS = BRASS
 BRZ = BRONZE OR GUNMETAL (BRZ/GM)
 CI = CAST IRON
 CU = COPPER
 GRA = GRAPHITE
 MS = MILD STEEL/BRIGHT MILD STEEL
 S/S = SILVER STEEL OR STAINLESS STEEL
 SPS = SPRING STEEL
 PEEK= POLYETHER ETHER KETONE
 SYN = SYNTHETIC MATERIAL SUCH 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

OTHER ABBREVIATIONS
 DP = DEEP
 PF = PRESS FIT
 PCD = PITCH CIRCLE DIAMETER
 RM = REAM
 HEX = HEXACON, 6SIDED
 CP = COMPRESSED
 KNL = KNURLED
 CSK = COUNTERSINK
 PL = PLACES
 CF = CLOSE FIT (SIZE FOR SIZE)
 D.A.A.= DRILL AFTER ASSEMBLY
 PFAA= PRESSFIT AFTER ASSEMBLY
 LCT = USE LOCTITE
 SA-xxx = SUB ASSEMBLY-xxx



NOTES:
 0. ALL DRAWINGS ARE IN METRIC MEASUREMENTS
 1. ALL ENGINEERING PRACTICES SHALL BE APPLIED WITH REGARDS TO HOLE AND SHAFT TOLERANCES.
 2. WHERE SCREWS OR BOLTS ARE USED THE CLEARANCE HOLES SHALL BE APPROXIMATELY 5% TO 8% LARGER THAN THE MATCHING TAPPED HOLE.
 3. PREFERABLY ALL TAPPED HOLES AND MATCHING SCREWS AND/OR BOLTS TO BE METRIC FINE (MF)
 4. MATERIALS SPECIFIED ON THE DRAWINGS ARE INDICATIVE ONLY. THE BUILDER CAN MAKE HIS/HER OWN MATERIAL CHOICE.
 5.
 6. ALL CONNECTIONS/JOINTS WHICH HAVE STEAM PRESSURE APPLIED TO IT SHALL BE SILVER/HARD SOLDERED.
 7. COMPRESSION SPRINGS ARE DRAWN IN COMPRESSED STATE (CP), UNCOMPRESSED STATE IS APPROX 40% TO 60% LONGER THEN COMPRESSED STATE.
 8. 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.
 9. 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.
 10. THE ORDER IN WHICH THE PARTS/COMPONENTS ARE MANUFACTURED AND THE MODEL IS ASSEMBLED IS ENTIRELY LEFT TO THE BUILDER/MODEL MAKER.
 11. ERRORS AND/OR OMISSIONS MAY OCCUR IN THE DRAWINGS, DO NOT HESITATE TO CONTACT ME SO THAT THE ERRORS/OMISSIONS CAN BE RECTIFIED.
 12. A COLOUR SCHEME FOR THIS PROJECT IS ENTIRELY LEFT UP TO THE MODEL MAKER.




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TITLE
**1 CYLINDER STEAM ENGINE "GRASSHOPPER"
 TYPE. (19mm BORE x 26mm STROKE)**

DRAWING CONTENTS
RENDERED PICTURE

PROJECT No 10-37-00
JDW DRAUGHTING SERVICES
 J.A.M. DE WAAL, 12 BRIGHTWELL STREET PAKAPURA 2110.
 NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000
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SHEET: 01 OF 01	A3	No: EVB-P37-1A