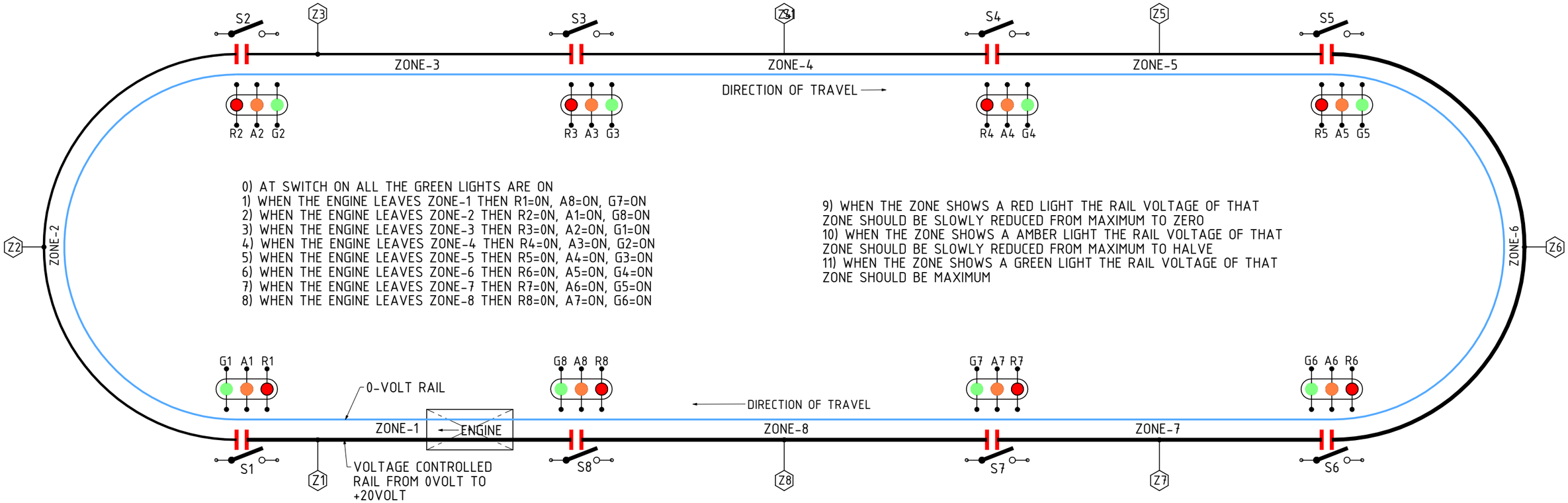

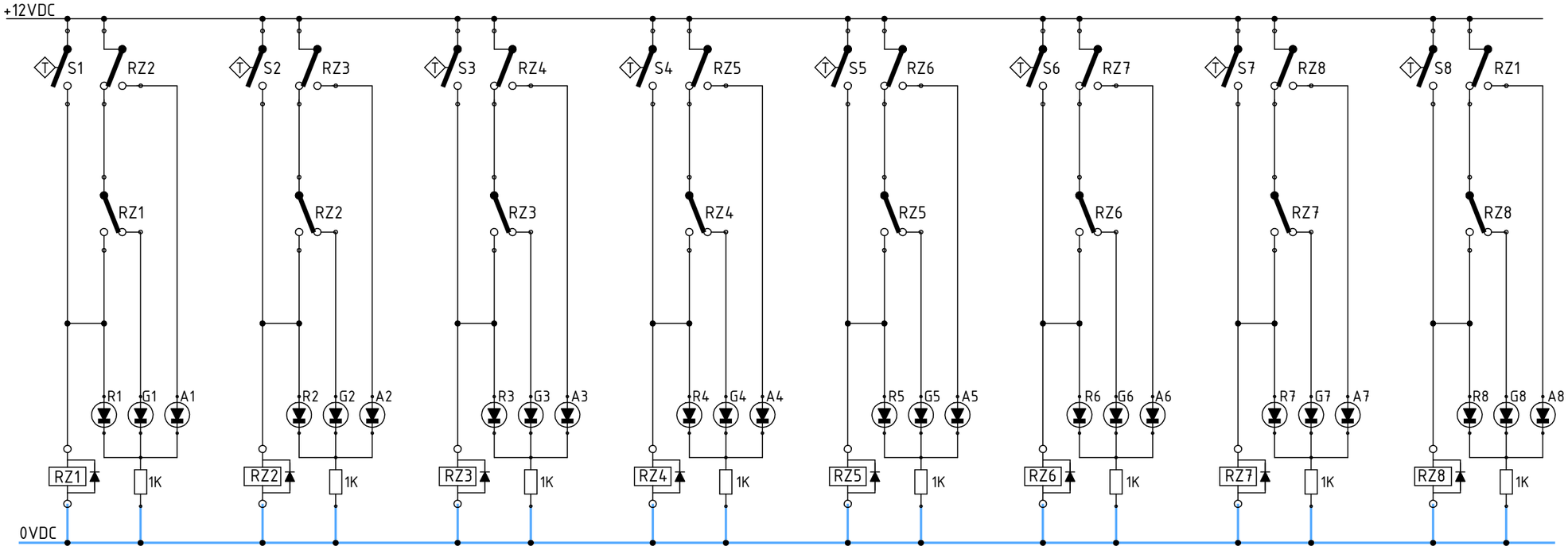

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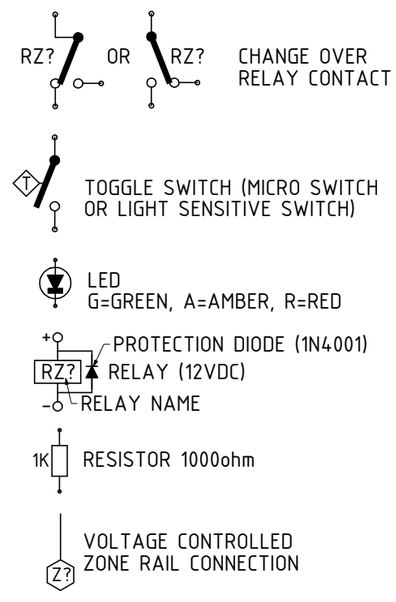

NOTES: DESIGNED BY JDW

TITLE

A 8-ZONE MODEL RAILWAY TRACK WITH SIGNALS (SINGLE CLOSED LOOP)

DRAWING CONTENTS

TRACK LAYOUT, OPERATING SWITCHES AND SIGNAL LIGHTS LOCATIONS+CONTROL CCT

PROJECT No 02-01-00

JDW DRAUGHTING SERVICES

J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000
E-MAIL: dewaal@xtra.co.nz.

PROJECTION JDWDS

DATE SEPTEMBER-2022

SHEET: 01 OF xx

MODEL SCALE: N/A

DWG SCALE: N/A

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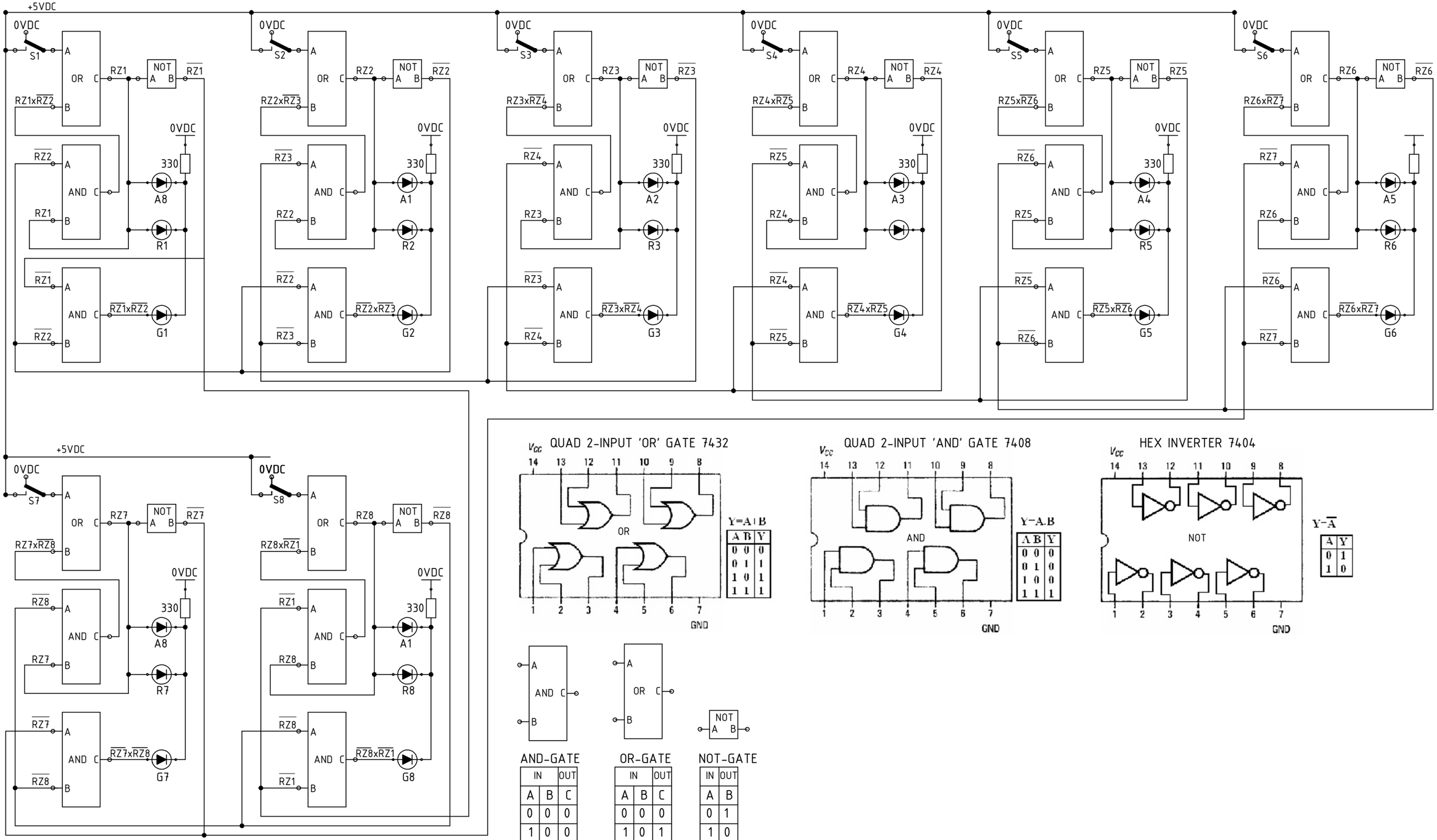
A3 No: 02-01-00-SHT-01



QUAD 2-INPUT 'OR' GATE 7432

Y=A | B

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

QUAD 2-INPUT 'AND' GATE 7408

Y=A.B

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

HEX INVERTER 7404

$Y=\overline{A}$

A	Y
0	1
1	0

AND-GATE

IN		OUT
A	B	C
0	0	0
1	0	0
0	1	0
1	1	1

OR-GATE

IN		OUT
A	B	C
0	0	0
1	0	1
0	1	1
1	1	1

NOT-GATE

IN	OUT
A	B
0	1
1	0

NOTES: DESIGNED BY JDW

TITLE

AN 8-ZONE MODEL RAILWAY TRACK WITH SIGNALS (SINGLE CLOSED LOOP)

DRAWING CONTENTS

CONTROL CCT SHEMATIC USING TTL IC CHIPS

PROJECT No 02-01-00

JDW DRAUGHTING SERVICES

J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000 E-MAIL: dewaal@xtra.co.nz.

PROJECTION JDWDS

DATE SEPTEMBER-2022

SHEET: 00 OF xx

MODEL SCALE: N/A

DWG SCALE: N/A

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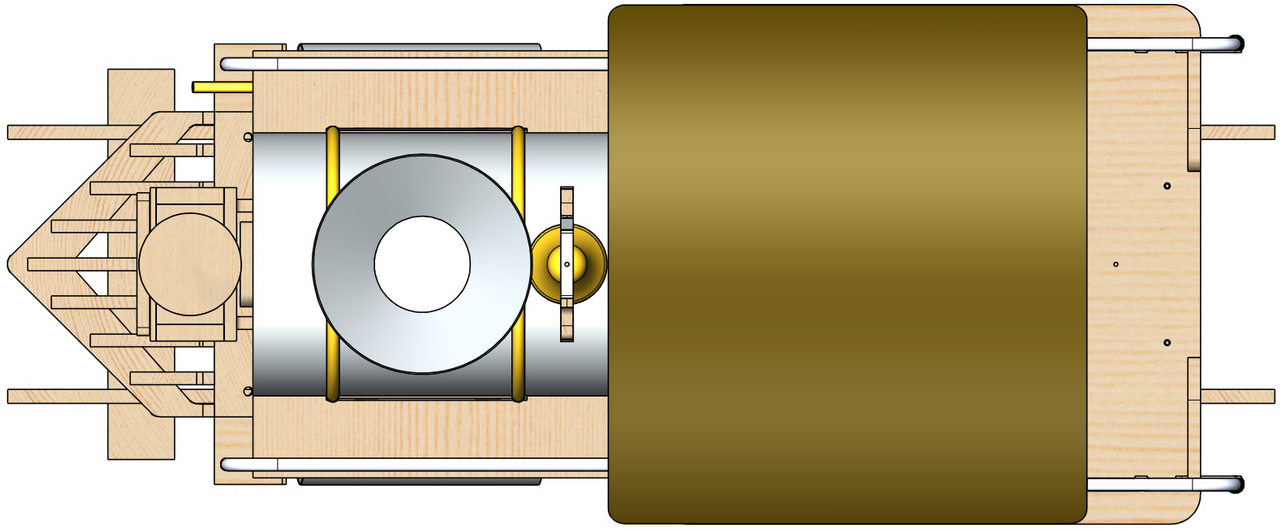
A3

No: 02-01-00-SHT-02

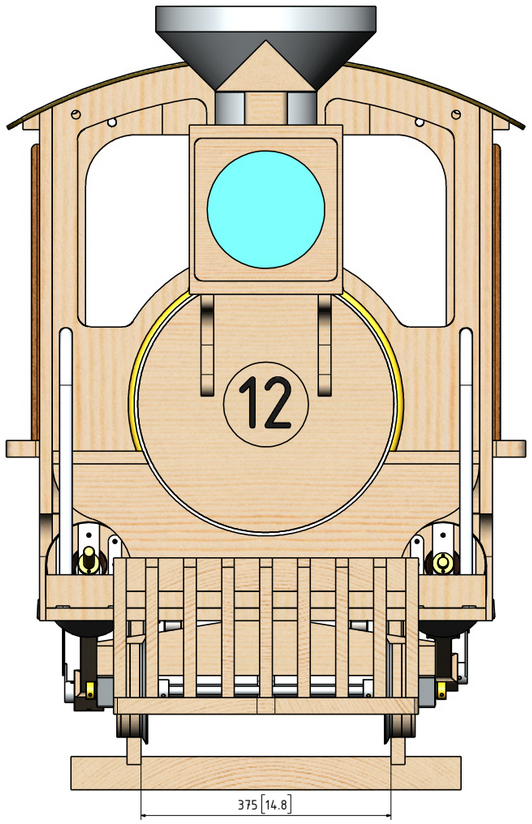
GENERAL NOTES:
0. ALL DRAWINGS ARE IN METRIC MEASUREMENTS
1. ALL ENGINEERING PRACTICES SHALL BE APPLIED WITH REGARDS TO HOLE AND SHAFT TOLERANCES.
2. WHERE SCREWS OR BOLTS ARE USED THE CLEARANCE HOLES SHALL BE APPROXIMATELY 5% TO 8% LARGER THAN THE MATCHING TAPPED HOLE.
3. PREFERABLY ALL TAPPED HOLES 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. ALL CONNECTIONS/JOINTS WHICH HAVE STEAM PRESSURE APPLIED TO IT SHALL BE SILVER/HARD SOLDERED.
6. COMPRESSION SPRINGS ARE DRAWN IN COMPRESSED STATE (CP), UNCOMPRESSED STATE IS APPROX 40% TO 60% LONGER THEN COMPRESSED STATE.
7. 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.
8. 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.
9. THE ORDER IN WHICH THE PARTS/COMPONENTS ARE MANUFACTURED AND THE MODEL IS ASSEMBLED IS ENTIRELY LEFT TO THE BUILDER/MODEL MAKER.
10. A COLOUR SCHEME FOR THIS PROJECT IS ENTIRELY LEFT UP TO THE MODEL MAKER.
11. THE MANNER IN WHICH THE PARTS/COMPONENTS ARE MANUFACTURED IS ENTIRELY LEFT UP TO THE BUILDER.
12. USE LOCTITE, ON SCREW OR PRESS FIT CONNECTIONS OR SURFACES, WERE DEEMED NECESSARY TO PREVENT PARTS FROM LOOSENING.
13. 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.

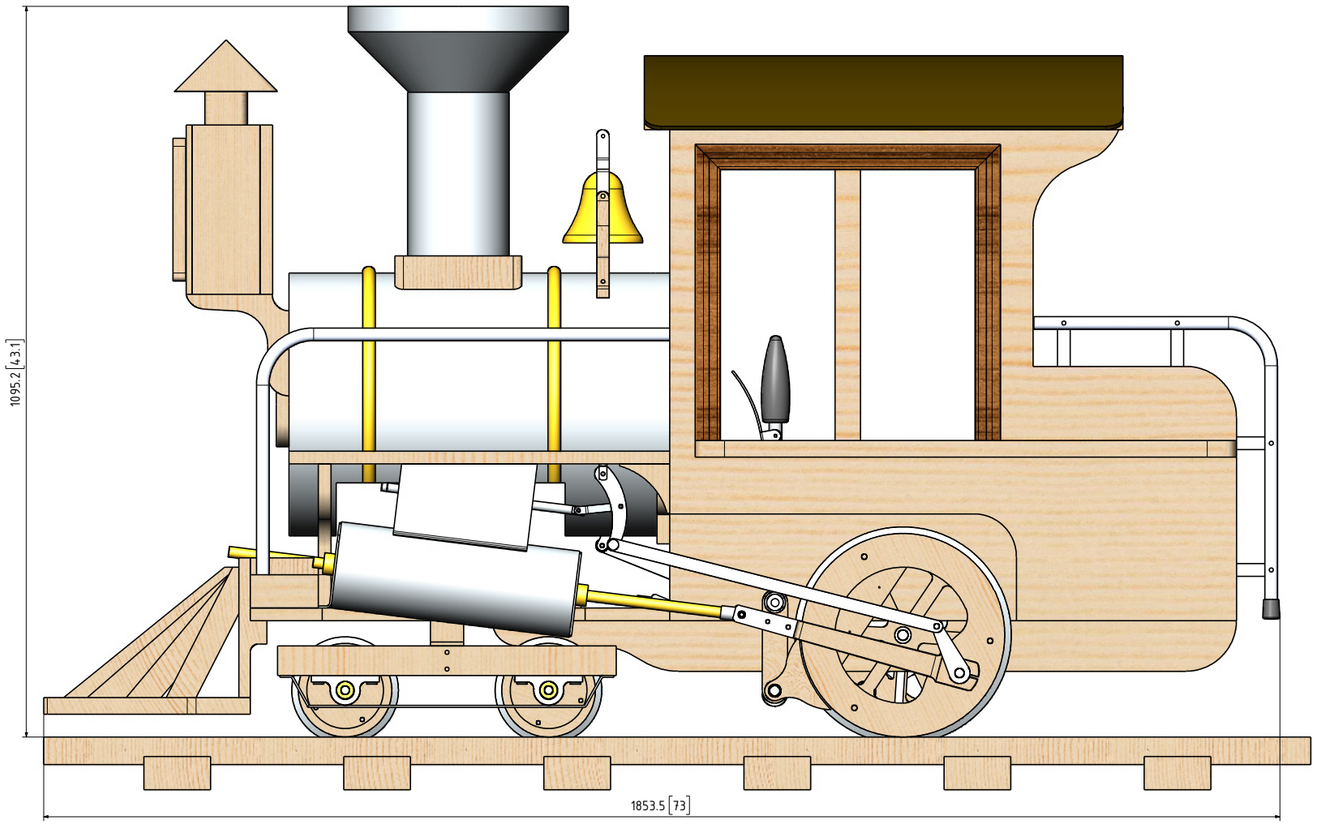
DUE TO THE LACK OF INFORMATION ON THE ORIGINAL DRAWING(S), SUCH AS VIEWS, DIMENSIONS, SECTIONS ETC AND/OR CLARITY OF COMPONENTS, OMITTED PARTS/COMPONENTS, SOME OF THE COMPONENTS MIGHT NOT BE AS CONSTRUCTED ORIGINALLY OR AS THE ORIGINAL DESIGNER INTENDED.

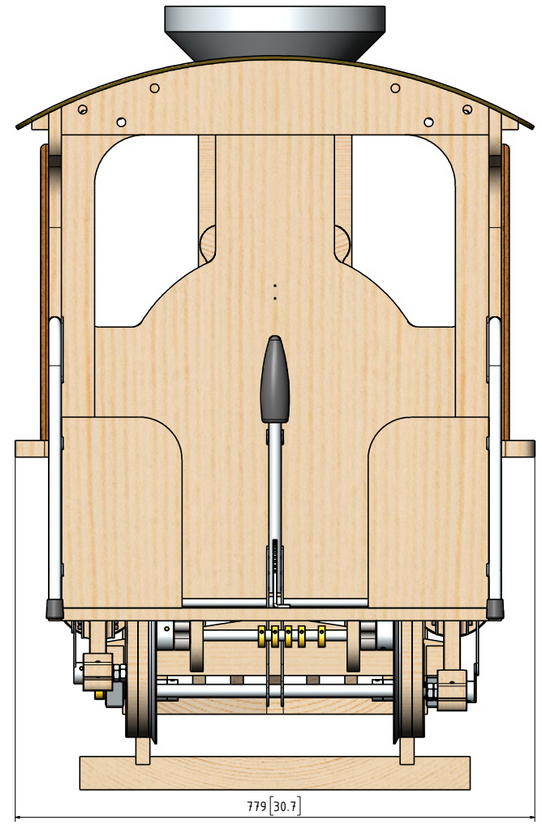


ADDITIONAL NOTES ABOUT THESE DRAWINGS:
1) NO MATERIALS HAVE BEEN SPECIFIED ON THESE DRAWINGS. THE BUILDER TO CHOOSE ITS OWN PREFERRED MATERIAL FOR THE PARTS/COMPONENTS. THE FOLLOWING COLOURS ON THE DRAWINGS INDICATES POSSIBLE MATERIALS WHICH CAN BE USED FOR PARTS:
YELLOW=BRASS, LIGHT GREY=ALUMINIUM OR MILD STEEL, REDDISH BROWN=COPPER, DARK BROWN=BRONZE OR GUN METAL, WHITISH=SILVER STEEL OR STAINLESS STEEL
2) FASTENERS.
NO FASTENERS SUCH AS BOLTS, SCREWS, RIVETS, NUTS AND WASHERS HAVE BEEN SHOW ON THESE DRAWINGS. THE BUILDER TO CHOOSE ITS OWN PREFERRED TYPE OF FASTENERS
3) APPEARANCE OF THE LOCOMOTIVE COULD BE ENHANCED BY ADDING SOME EXTRA PARTS SUCH AS: REAR LIGHTS, FLAG HOLDERS, REAL.
4) NOT SHOWN ON THESE DRAWING BUT MENTIONED ON THE ORIGINAL DRAWINGS ARE THE FOLLOWING:
A) FORWARD-REVERSE CONTROL SWITCHES
B) BATTERIES
C) LEAF SWITCHES
D) 6V AUTO STARTER RELAYS

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
MAX/MIN = CRITICAL DIMENSION
[SA-xxx]= SUB ASSEMBLY-xxx







IT HAS TO BE KEPT IN MIND THAT THIS ENGINE IS JUST A TOY

NOTES: FOUND THE ORIGINAL DRAWINGS ON THE INTERNET. TITLE OF THE DOCUMENTATION IS: "BACK-YARD RAILROAD" BY W. CLYDE LAMMEY. DESIGN AND BUILD BY ROBERT WOOLSON. TO DOWN LOAD ORIGINALS GO TO: https://www.scribd.com/document/2532299/Train-Backyard-Toy#sidebar

TITLE
A BACK-YARD (GARDEN) TOY LOCOMOTIVE ELECTRICALLY OPERATED (PUSH/PULL COILS)

DRAWING CONTENTS
GENERAL ARRANGEMENT & NOTES

PROJECT No 02-02-00

JDW DRAUGHTING SERVICES
J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000 E-MAIL: dewaal@xtra.co.nz.

PROJECTION JDWDS

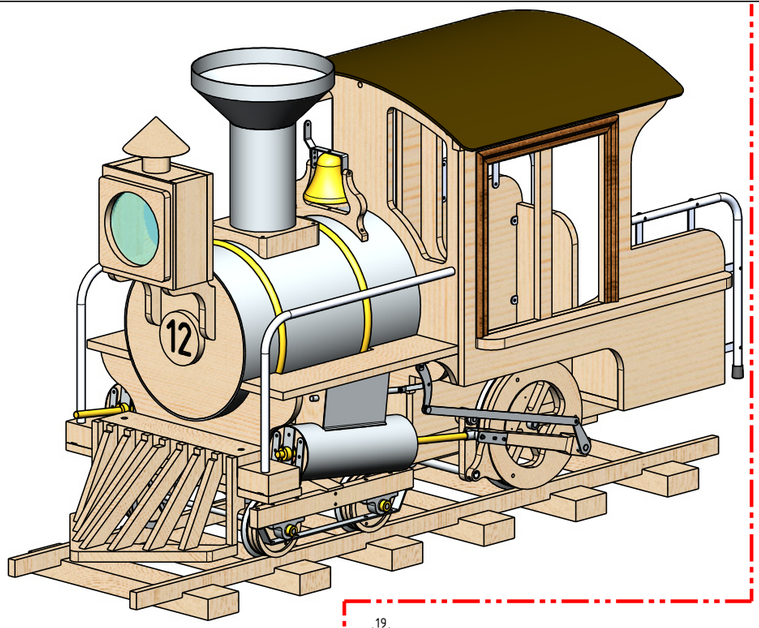
DATE SEPTEMBER 2022

SHEET: 01 OF 07

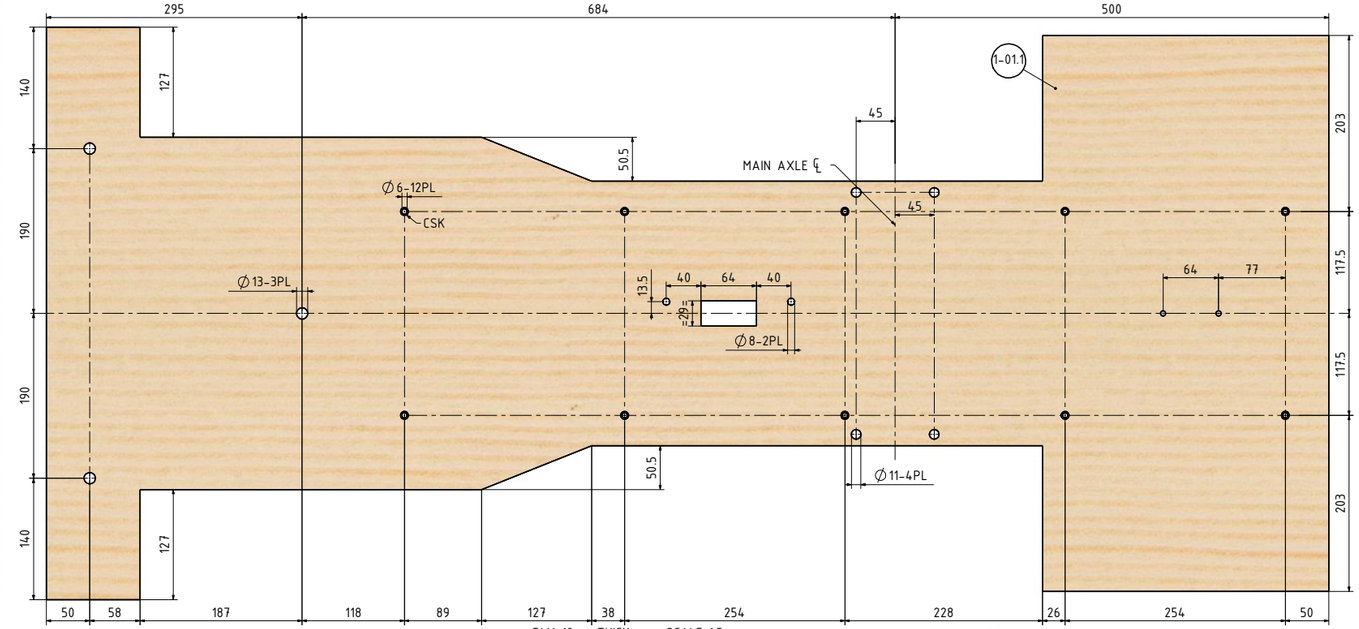
MODEL SCALE: N/A
DWG SCALE: 1:1 @A2 OR AS SHOWN
Copyright ©J.A.M. DE WAAL PAPAKURA NZ
A2 No: 02-02-00-SHT-01

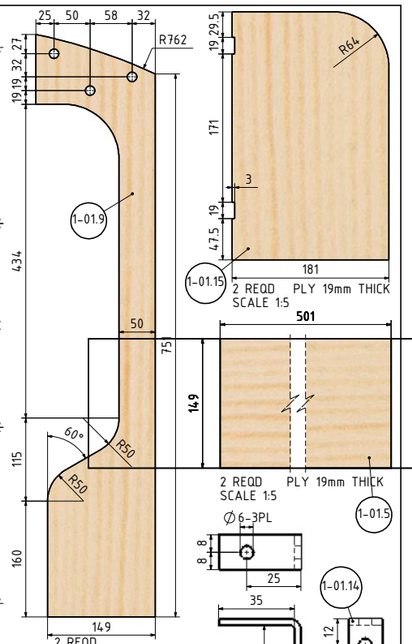
PLEASE NOTE THIS IS AN "A2" SIZE SHEET

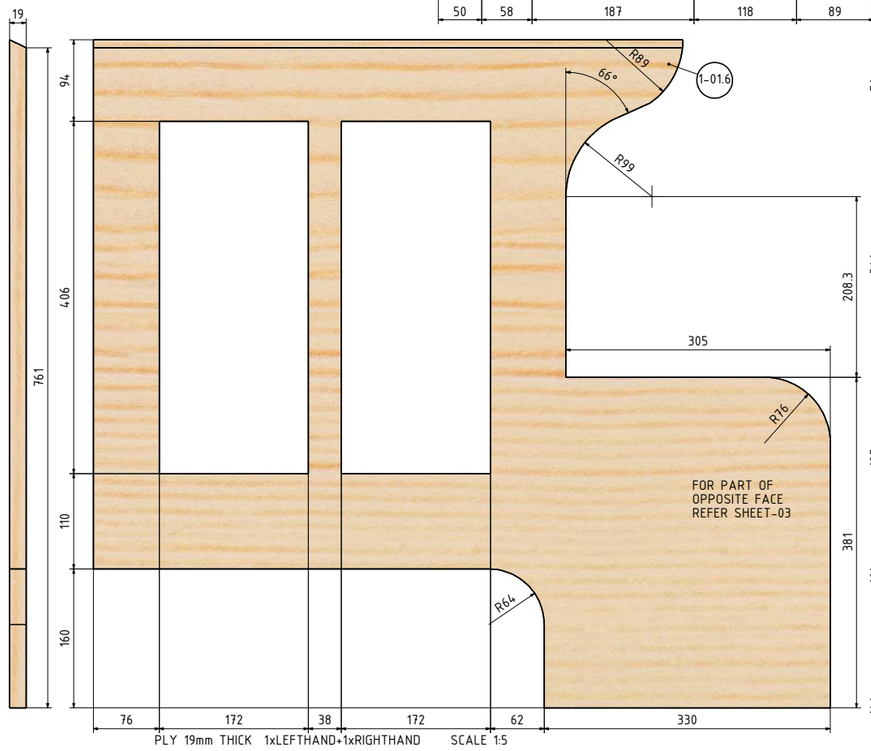
DRAWINGS ARE FOR PERSONAL USE ONLY NOT FOR COMMERCIAL PURPOSES

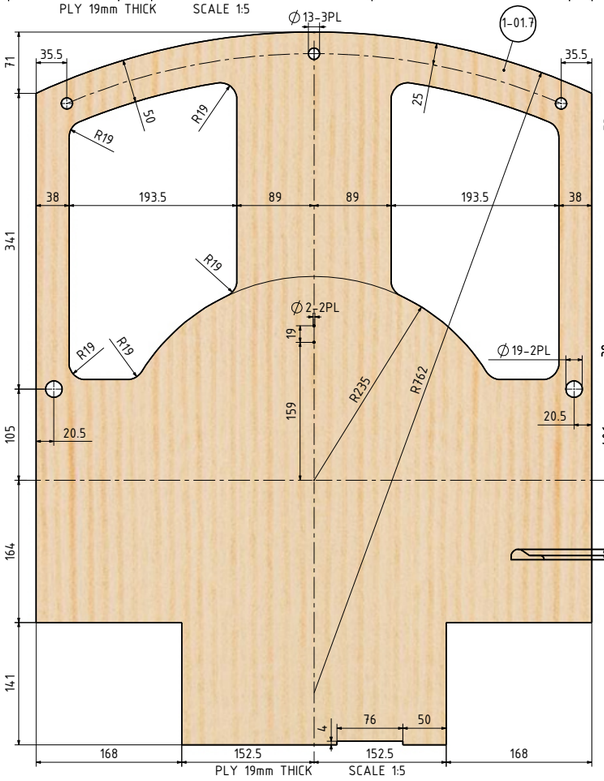


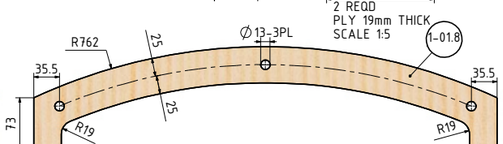
QTY.	PART NUMBER
1	02-02-00-1-01-BASE FRAME
1	02-02-00-1-02-COW CATCHER
1	02-02-00-1-03-BOILER CRADLE
1	02-02-00-1-04-SMOKE STACK
1	02-02-00-1-05-HEADLIGHT
2	02-02-00-1-06-MAIN AXLE BEARING BLOCK
1	02-02-00-1-07-CYLINDER
1	02-02-00-1-07-CYLINDER
4	02-02-00-1-08-CYLINDER MOUNTING BRACKET
1	02-02-00-1-09-CYLINDER REAR SUPPORT BRACE
1	02-02-00-1-10-FRONT BOGIE FRAME
1	02-02-00-1-11-BRAKE LEVER QUADRANT
1	02-02-00-1-12-BELL HANGER FRAME
2	02-02-00-1-13-FRONT HAND RAIL
1	02-02-00-1-14-REAR HAND RAIL
1	02-02-00-1-14-REAR HAND RAIL
1	02-02-00-2-01-DRIVEN WHEELS+AXLE
2	02-02-00-2-02-PISTON
2	02-02-00-2-03-CON-ROD
2	02-02-00-2-04-VALVE ROCKER
2	02-02-00-2-05-VALVE ACTUATING ROD
2	02-02-00-2-06-VALVE ROD LINK
2	02-02-00-2-07-FRONT BOGIE WHEELS+AXLE
1	02-02-00-2-08-BRAKE SHAFT+LINK
1	02-02-00-2-09-BRAKE SHOE+ROD
2	02-02-00-2-10-VALVE ROD
1	02-02-00-2-11-BRAKE HANDLE
1	02-02-00-2-12-BRAKE LOCKING PAWL
1	02-02-00-2-13-BRAKE PAWL OPERATOR
1	02-02-00-2-14-BRAKE PULL ROD
1	02-02-00-2-15-BELL
6	02-02-00-M14 NUT
6	02-02-00-M14 WASHER
1	02-02-00-RAIL

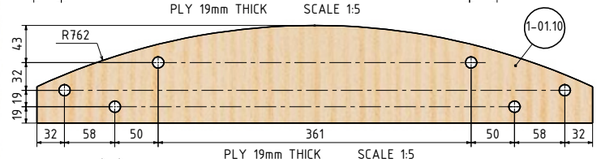


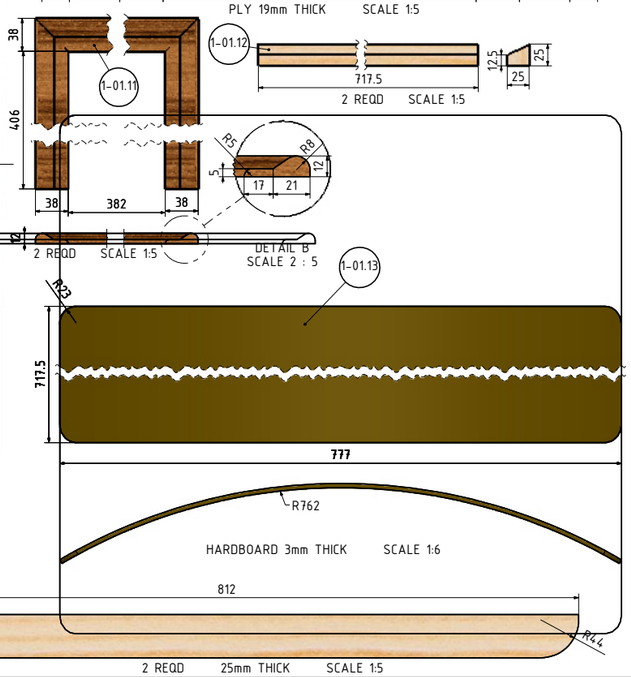


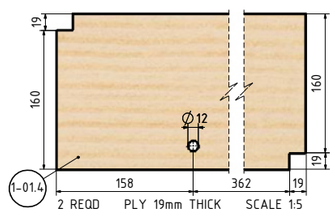


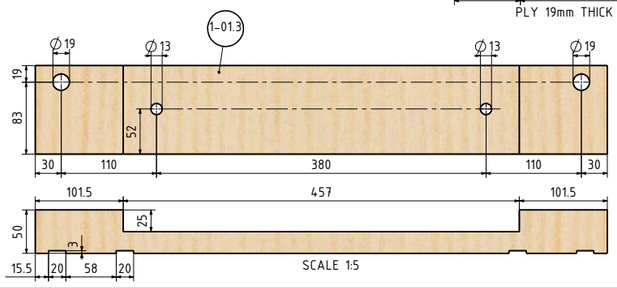




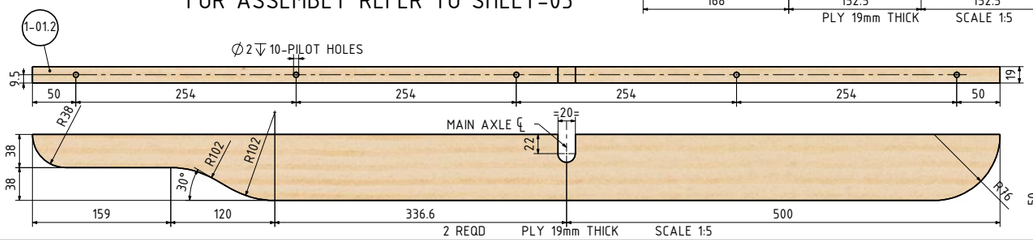








FOR ASSEMBLY REFER TO SHEET-03



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TITLE

A BACK-YARD (GARDEN) TOY LOCOMOTIVE ELECTRICALLY OPERATED (PUSH/PULL COILS)

DRAWING CONTENTS

ISOMETRIC VIEW, BILL OF MATERIALS, PARTS AND ASSEMBLIES

PROJECT No 02-02-00

JDW DRAUGHTING SERVICES

J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000 E-MAIL: dewaal@xtra.co.nz.

PROJECTION JDWDS DATE SEPTEMBER 2022

MODEL SCALE: N/A

DWG SCALE: 1:1 @A2 OR AS SHOWN

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SHEET: 02 OF 07 A2 No: 02-02-00-SHT-02

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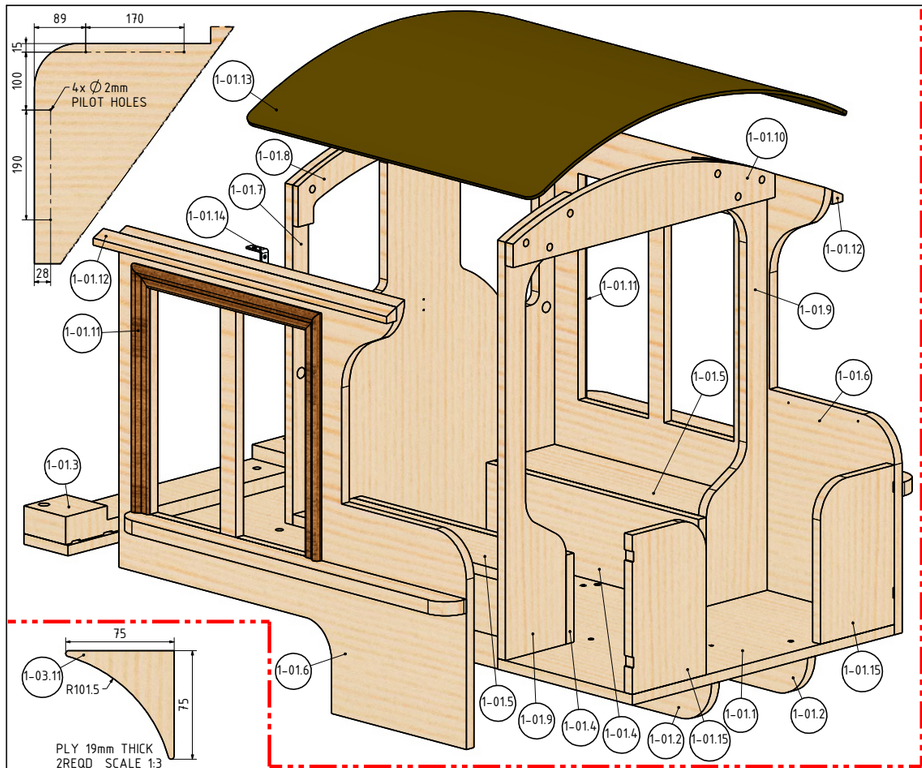

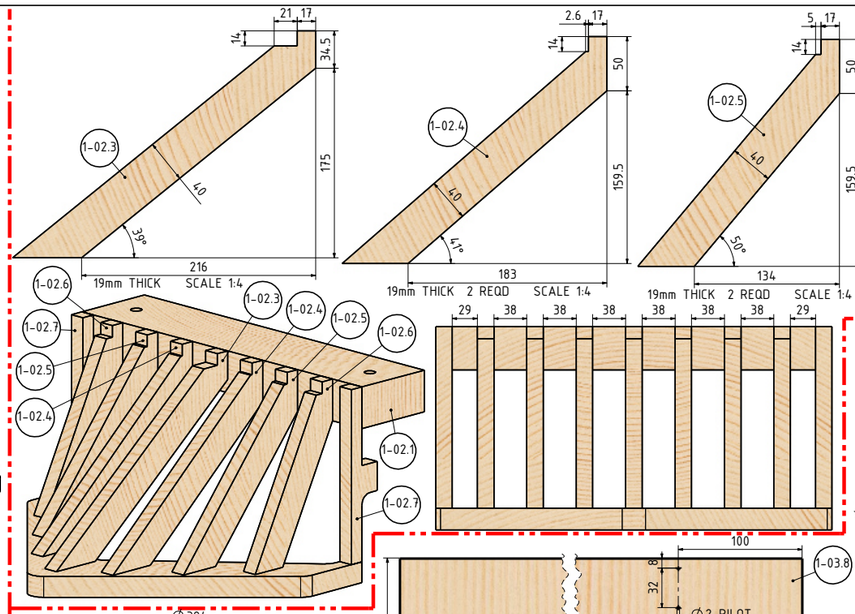

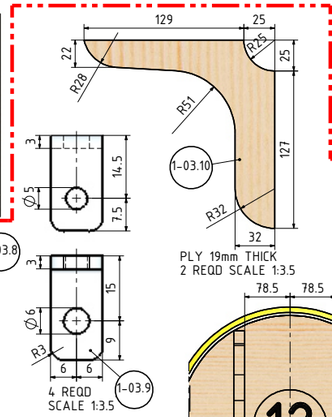

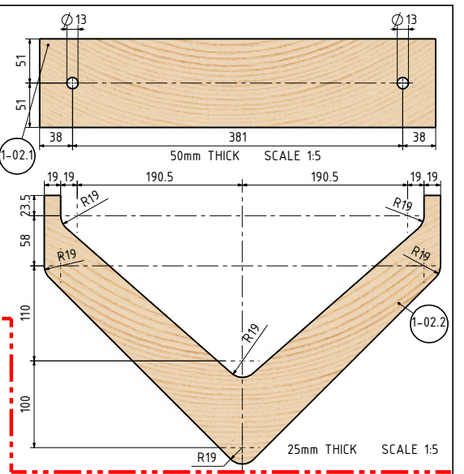

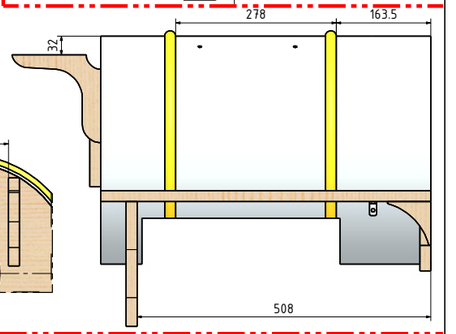

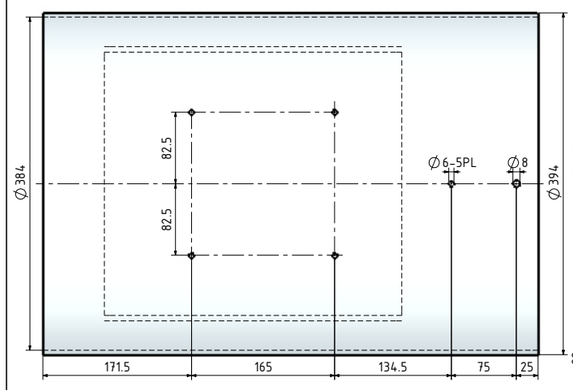

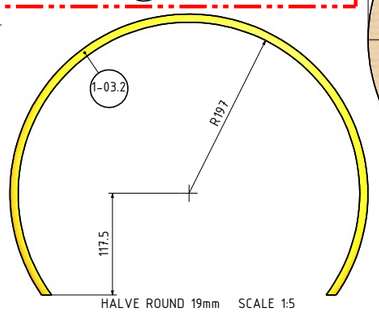

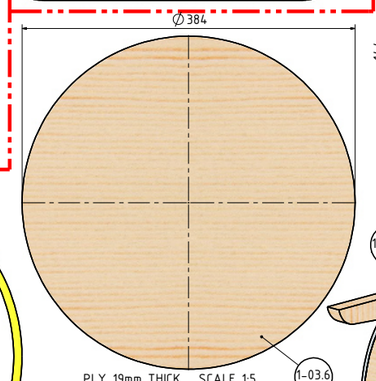

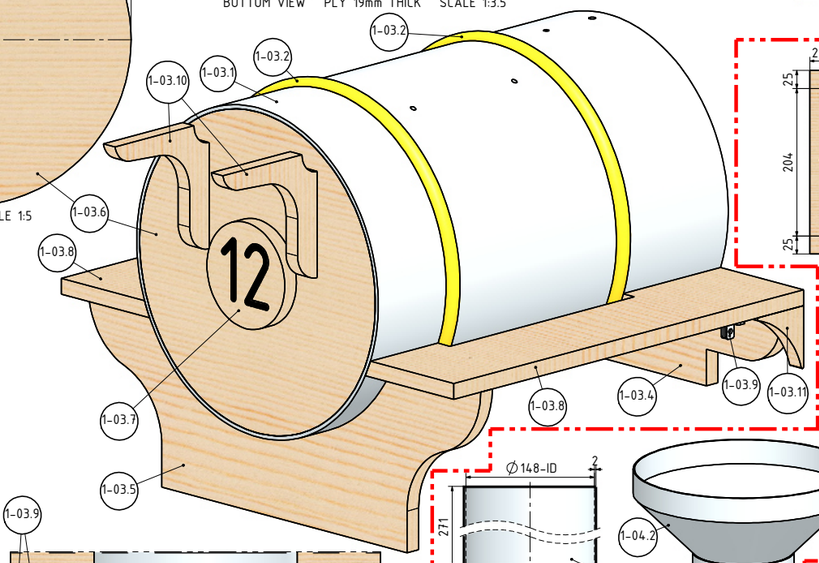

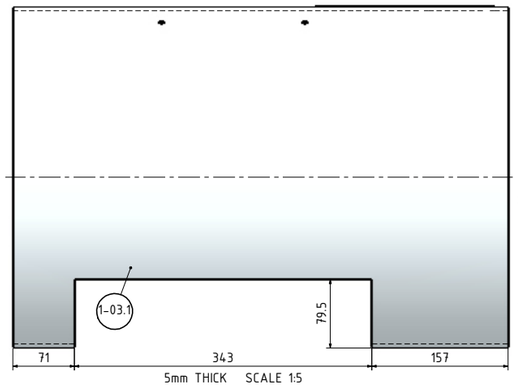

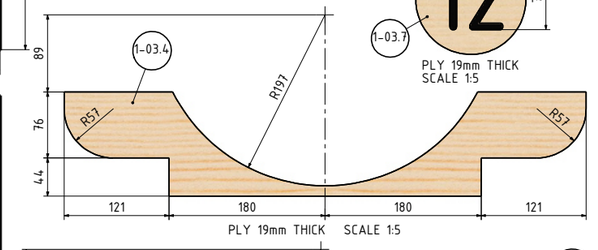

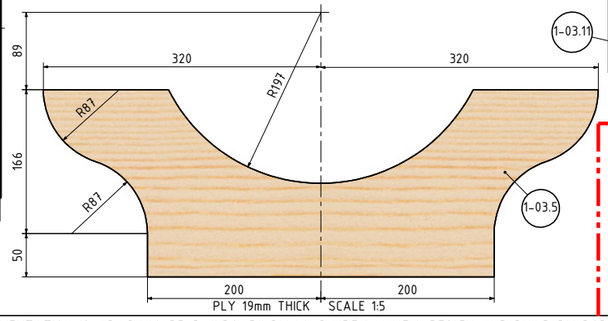

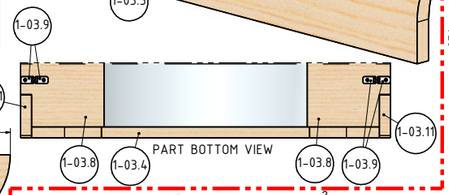

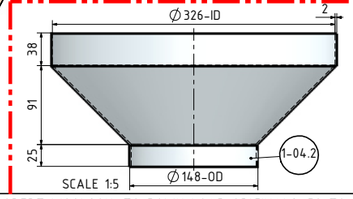

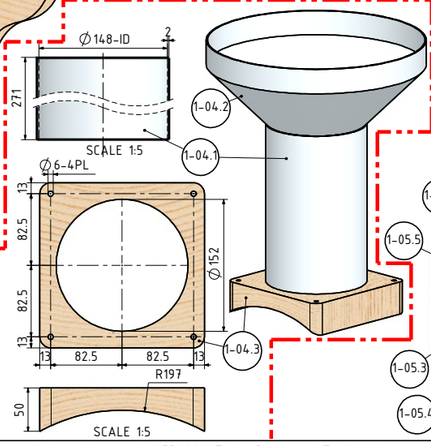

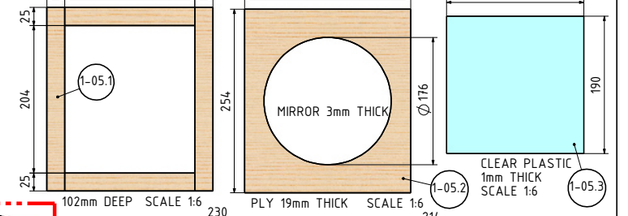

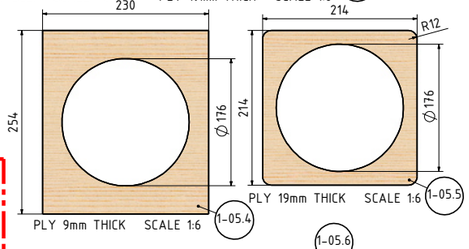

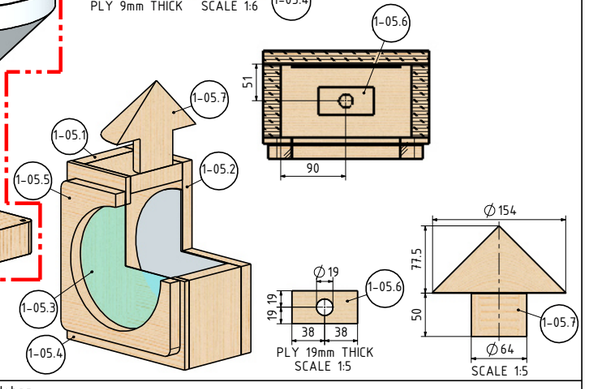

NOTES: FOUND THE ORIGINAL DRAWINGS ON THE INTERNET. TITLE OF THE DOCUMENTATION IS: "BACK-YARD RAILROAD" BY W. CLYDE LAMMEY. DESIGN AND BUILD BY ROBERT WOOLSON. TO DOWN LOAD ORIGINALS GO TO: https://www.scribd.com/document/2532299/Train-Backyard-Toy#sidebar

TITLE

A BACK-YARD (GARDEN) TOY LOCOMOTIVE ELECTRICALLY OPERATED (PUSH/PULL COILS)

DRAWING CONTENTS

PARTS AND ASSEMBLIES

PROJECT No 02-02-00

JDW DRAUGHTING SERVICES
J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000 E-MAIL: dewaal@xtra.co.nz.

JDWDS

MODEL SCALE: N/A

DWG SCALE: 1:1 @A2 OR AS SHOWN

DATE SEPTEMBER 2022

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SHEET: 03 OF 07 A2 No: 02-02-00-SHT-03

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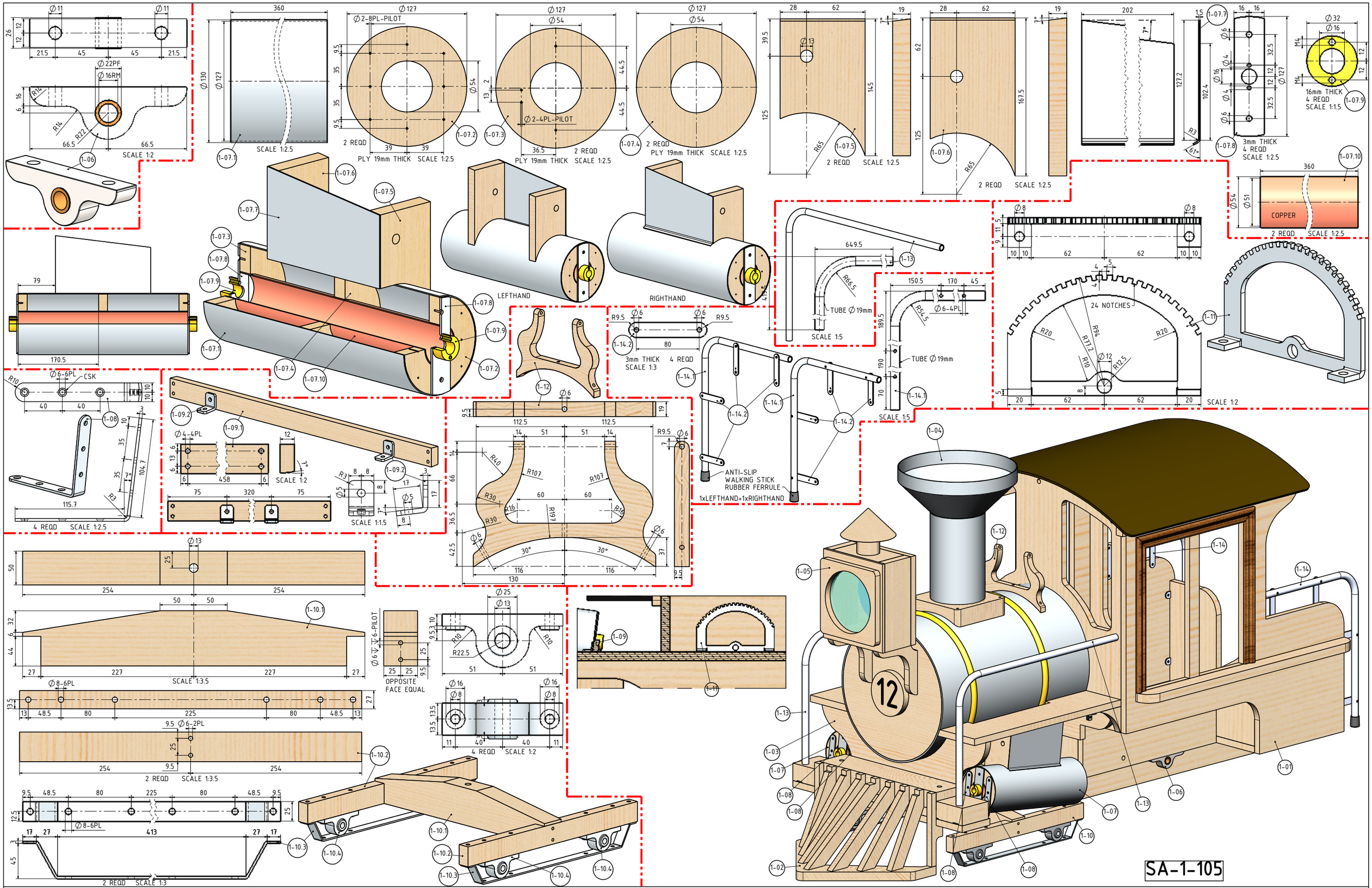

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TITLE

A BACK-YARD (GARDEN) TOY LOCOMOTIVE ELECTRICALLY OPERATED (PUSH/PULL COILS)

DRAWING CONTENTS

PARTS AND ASSEMBLIES

PROJECT No 02-02-00

JDW DRAUGHTING SERVICES
J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000 E-MAIL: dewaal@xtra.co.nz.

PROJECTION | JDWDS | MODEL SCALE: N/A

DWG SCALE: 1:1 @A2 OR AS SHOWN

DATE: SEPTEMBER 2022

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SHEET: 04 OF 07 | A2 | No: 02-02-00-SHT-04

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2 REQD SCALE 1:3

SECTION A-A SCALE 1 : 3

PLY 22mm THICK 2 REQD SCALE 1:3

SECTION B-B SCALE 1 : 3

PLY 16mm THICK SCALE 1:5

PLY 19mm THICK SCALE 1:5

2 REQD SCALE 1:2

5 REQD SCALE 1:2

2 REQD SCALE 1:2

2 REQD SCALE 1:2

2 REQD SCALE 1:2

3mm THICK 4 REQD SCALE 1:2

3mm THICK 4 REQD SCALE 1:2

2 REQD SCALE 1:3

2 REQD SCALE 1:1.5

PLY 16mm+19mm THICK 2 REQD SCALE 1:3

5mm THICK SCALE 1:1.5

4 REQD SCALE 1:2

2 REQD SCALE 1:2

ALUM. TUBE SCALE 1:3

SCALE 1:3

2 REQD SCALE 1:2

2 REQD SCALE 1:2

4 REQD SCALE 1:3

SECTION C-C SCALE 1 : 3

PLY 14mm THICK 4 REQD SCALE 1:5

3mm THICK 2 REQD SCALE 1:2

4 REQD SCALE 1:3

SECTION D-D SCALE 1 : 3

PLY 6mm THICK 4 REQD SCALE 1:5

2 REQD SCALE 1:2

2 REQD SCALE 1:2

PLY 12.5mm+19mm THICK 2 REQD SCALE 1:3

2 REQD SCALE 1:2

ALUM. TUBE SCALE 1:3

SCALE 1:5

SCALE 1:2

SCALE 1:3

SCALE 1:2

SA-2-201

ONLY WASHERS AND NUTS ADDED

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TITLE

A BACK-YARD (GARDEN) TOY LOCOMOTIVE ELECTRICALLY OPERATED (PUSH/PULL COILS)

DRAWING CONTENTS

PARTS AND ASSEMBLIES

PROJECT No 02-02-00

JDW DRAUGHTING SERVICES
J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000 E-MAIL: dewaal@xtra.co.nz.

PROJECTION JDWDS

DATE SEPTEMBER 2022

SHEET: 05 OF 07

MODEL SCALE: N/A

DWG SCALE: 1:1 @A2 OR AS SHOWN

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A2 No: 02-02-00-SHT-05

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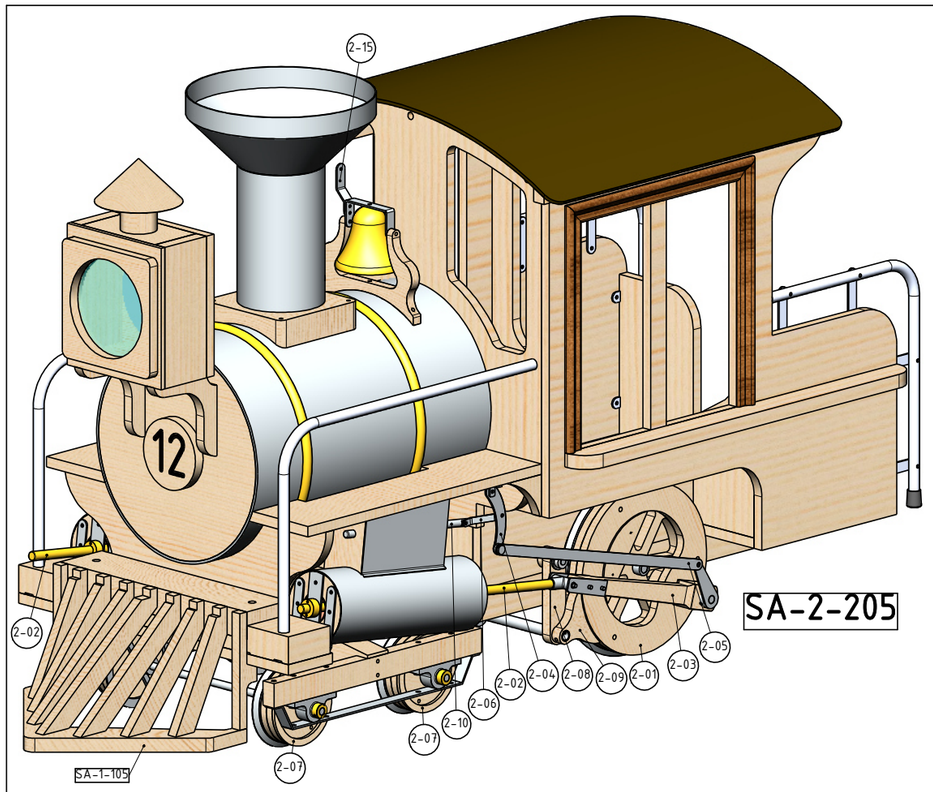
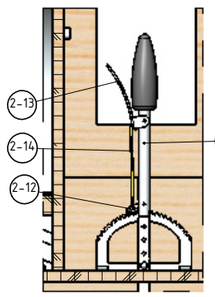
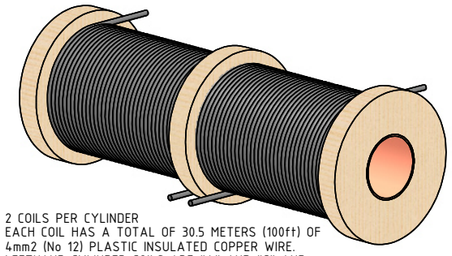
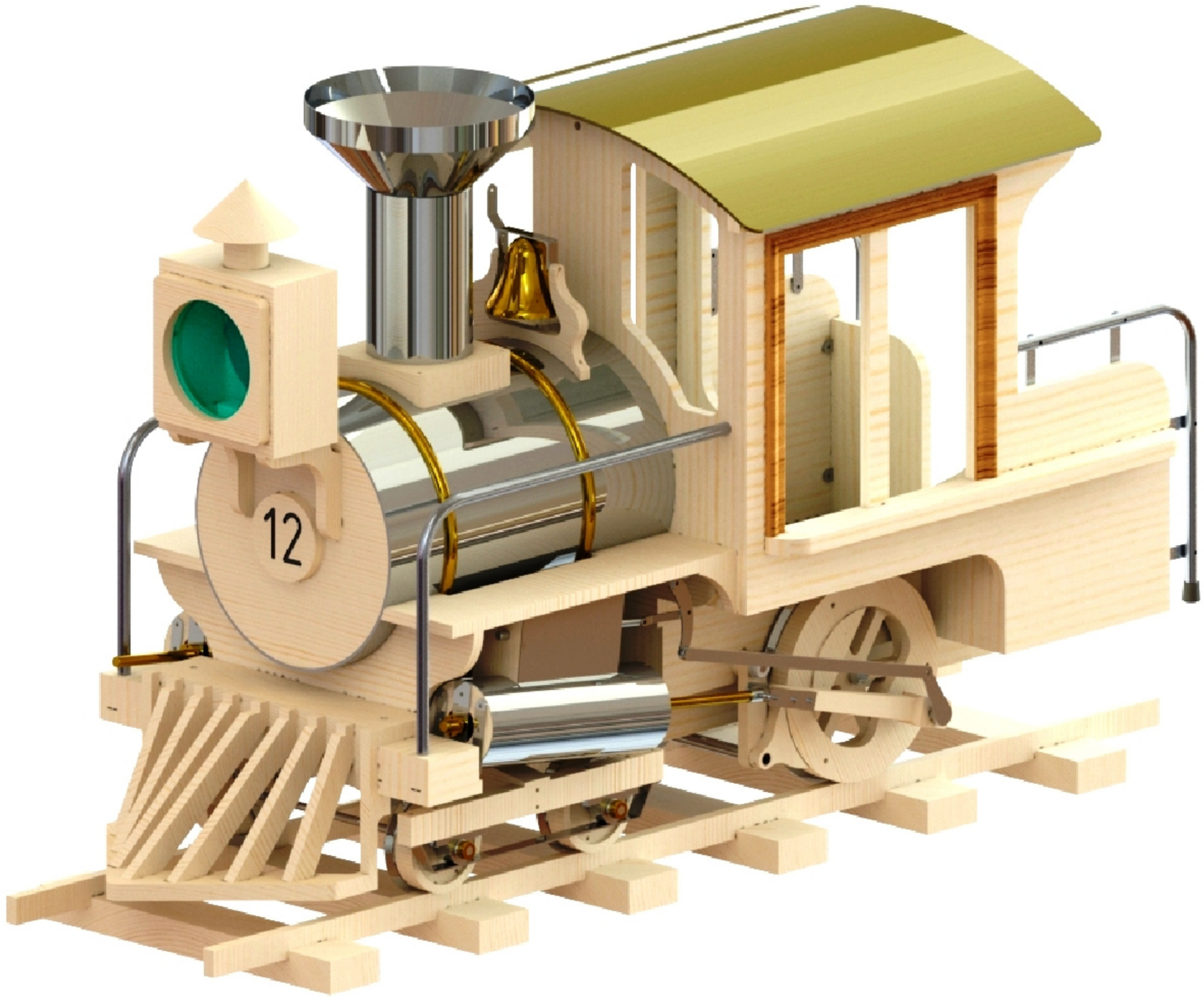






2 COILS PER CYLINDER
EACH COIL HAS A TOTAL OF 30.5 METERS (100ft) OF 4mm2 (No 12) PLASTIC INSULATED COPPER WIRE.
LEFTHAND CYLINDER COILS ARE "A" AND "C" AND RIGHT HAND COILS ARE "B" AND "D".
FOR CONNECTION OF THE COILS REFER TO CIRCUIT DIAGRAM ON SHEET-07.



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TITLE
A BACK-YARD (GARDEN) TOY LOCOMOTIVE ELECTRICALLY OPERATED (PUSH/PULL COILS)

DRAWING CONTENTS
PARTS AND ASSEMBLIES, NOTES AND RENDERED PICTURE

PROJECT No 02-02-00

JDW DRAUGHTING SERVICES
J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000 E-MAIL: dewaal@xtra.co.nz.

PROJECTION JDWDS

DATE SEPTEMBER 2022

SHEET: 06 OF 07

MODEL SCALE: N/A

DWG SCALE: 1:1 @A2 OR AS SHOWN

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A2 No: 02-02-00-SHT-06

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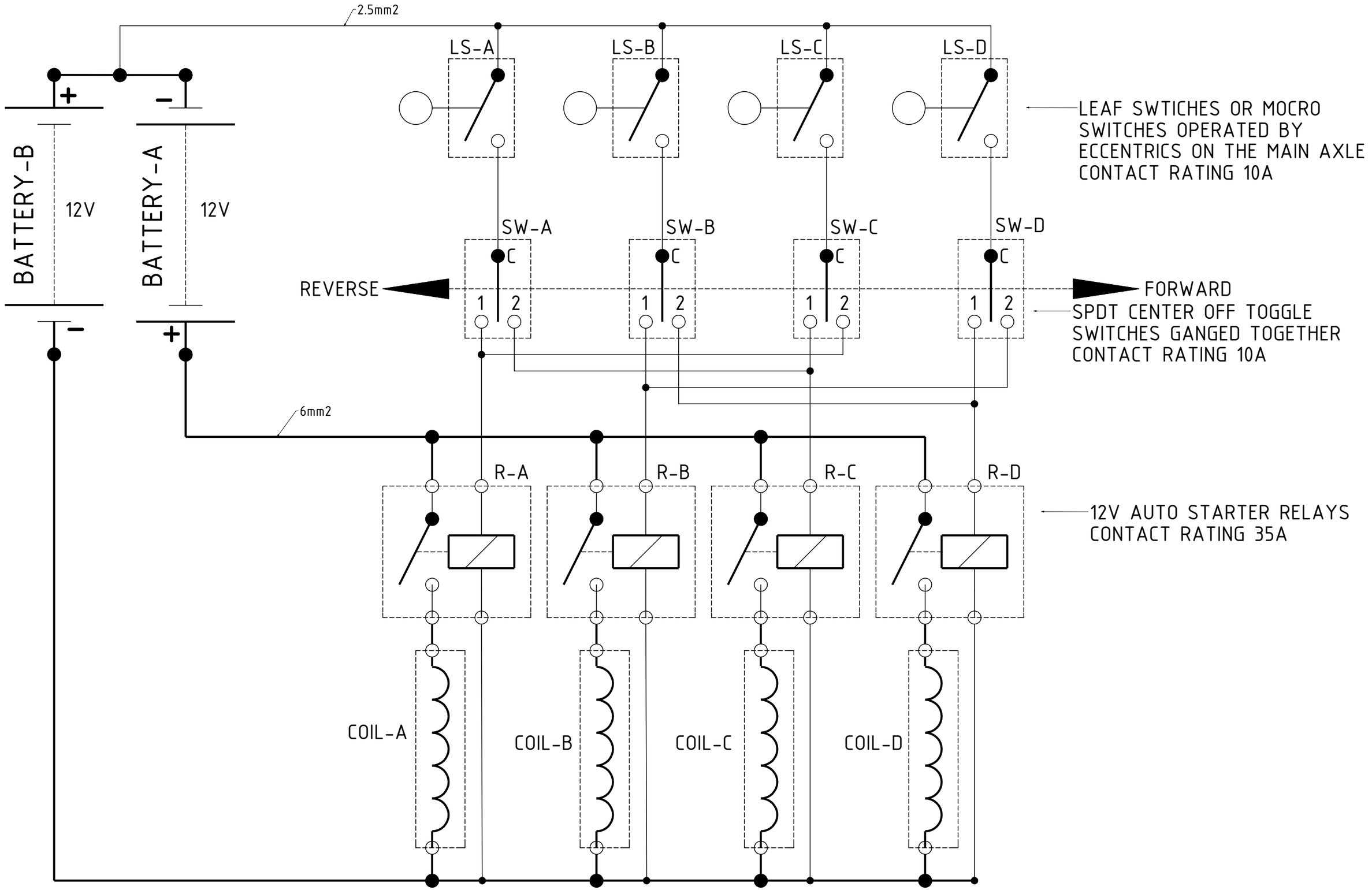

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TITLE

A BACK-YARD (GARDEN) TOY LOCOMOTIVE ELECTRICALLY OPERATED (PUSH/PULL COILS)

DRAWING CONTENTS

ELECTRICAL CONNECTION CIRCUIT DIAGRAM

PROJECT No 02-02-00

JDW DRAUGHTING SERVICES
J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000 E-MAIL: dewaal@xtra.co.nz.

PROJECTION JDWDS

DATE SEPTEMBER 2022

SHEET: 07 OF 07

MODEL SCALE: N/A

DWG SCALE: 1:1 @A2 OR AS SHOWN

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A2 No: 02-02-00-SHT-07

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