



*Australian Railway Kits*

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**Incorporating Main West Models**

**Manufacturers, Wholesalers and Retailers of Quality Australian Model Railways**

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# **NSWGR C35 4-6-0**

## **Locomotive and Tender Kit**

**E194 Manufactured Exclusively for AR Kits by DJH Engineering from Patterns owned by AR Kits**

**PLEASE READ INSTRUCTIONS THOROUGHLY BEFORE COMMENCING ASSEMBLY**

### **CONSTRUCTION**

It is important to ensure that all parts are clean, free of "flash" (excess metal on the castings) and fit properly. The "flash line" is easily removed from most areas by scraping gently with a sharp hobby knife - a round blade is more effective than a straight pointed type. Pull the blade along the "flash line" - several light strokes are better than a single one. Some areas are better cleaned up with 6" jewellers' files. Take care not to flatten round parts by filing too heavily. All locating holes for detail fittings should be pre-drilled to the size specified in the instructions. Sometimes it is necessary to clean out these holes with a "rat tail" file; take care not to snap off the tip of the file. Gently wash the castings in warm soapy water to remove mould release residue.

Etched brass items are best removed from the fret by placing the fret on a scrap piece of hard timber (e.g. Pyneboard) and cutting the tabs with a large Stanley knife - cut the tab at the point furthest away from the part, then trim the tab off close to the part with a small pair of quality side cutters. Hold small parts with a pair of flat nosed (not serrated jaws) pliers while cleaning up with jewellers' files. Be careful not to distort the etchings; they are difficult to straighten if bent or twisted. Drill all required holes before assembly, noting the spigot sizes of the fittings, because some holes will be difficult to drill after parts are assembled.

Modellers are advised to check photographs of the particular locomotive they have chosen to model, also keeping in mind the era they are modelling. For assistance in general detailing, modellers are referred to the Data Sheet's plan of the C35 and the many photos which appear in Australian railway books and journals.

These kits are designed to give many years of operating pleasure. A little extra time taken during construction will ensure that your kit will do this. It cannot be emphasised too strongly that the basis of a smoothly operating model is care when constructing the chassis and valve gear, ie you must double check every step. Check that the axles turn freely in their bearings, check again with the coupling rods on, then again with the connecting rods on, etc, etc.

### **Assembly methods**

The two main construction methods are:

(a) Low melt solder - Low melt solder is an excellent medium for use with white metal kits. It is quick and easy providing a stronger joint than can be achieved with glue. It has the added advantage of easily repairing minor casting flaws, and because of the relatively low temperature, many parts can be held in the fingers while soldering. Brass to white metal joints can also be made by "tinning" the brass first with normal solder. Low melt soldering requires the correct type of soldering iron (e.g. Dick Smith T2200). These irons have temperature control, as low melt solder only requires between 70 degrees and 200 degrees Celsius. You must use special low melting point solder, such as that available from AR Kits.

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**IT IS ADVISABLE NOT TO ATTEMPT TO SOLDER ANY CASTINGS WITH A STANDARD SOLDERING IRON**

(b) Glue - Superglue and Plastibond are two types of glues suitable for use with this kit. Some modellers prefer to superglue major joints first then "fillet" the joint with Plastibond. Small detail parts are best glued with Superglue. Glue is not recommended for those parts needing good electrical contact, such as the tender bogies. Whichever method you choose, "dry fit" parts first to ensure a good fit.

**Electrical Pickup**

The electrical system used on these kits is called "half live". Looking from the top facing forward the locomotive chassis collects current from the live wheels on the right-hand side, shown as LS (live side) on the drawings. The tender is insulated from the locomotive chassis by plastic bush and current is collected from the wheels on the left-hand side of the tender.

**Cleaning up/Painting**

On completion, any areas which were soldered should be washed using a soft brush and methylated spirits. Alternatively an excellent pressure pack flux remover is also available from Dick Smith stores. Then wash thoroughly in warm soapy water. Rinse with clean water and allow to dry thoroughly before applying a suitable self-etch primer.

**Spare Parts**

Spare parts are available on a replacement basis. Should any part be missing or damaged contact AR Kits for a replacement. Should you have any problems with the Mashima motor please do not attempt to repair it yourself - return the motor to us. Mashima will not replace motors which have been tampered with.

Should you have any queries or problems with construction please drop us a note and we will do our best to advise. Likewise we would be pleased to hear any suggestions you may have for improving the kits or instructions.

**General**

The following drill sizes are required: 0.4mm, 0.5mm, 0.6mm, 0.7mm, 0.8mm, 0.9mm, 1.0mm, 1.1mm, 1.25mm, 1.7mm, 2.0mm.

During construction refer to the drawings at all times. A number of parts are quite similar, so double check if in doubt. Note that attached to the instructions is a photocopy of the lost wax brass castings sprues with each part numbered for easy identification. In the general instructions the part numbers are shown in brackets.

The instructions sometimes refer to the right hand (R/H) and left hand (L/H) side. This is taken as viewing the model from above and looking forward.

To minimise the risk of losing parts, do not remove them from the etched fret or the plastic packing until you are ready to use them. We recommend that you start construction with the tender.

**Safety First**

These models are not toys and are not suitable for young children. White metal castings contain lead and modellers are advised to wash their hands after working with unpainted white metal castings. When using superglue, solder or when spray painting, ensure your work area is well ventilated.

**Drawing 1 (Parts 1 - 42)**

Take the tender base/sides (1) and fold the sides up as shown - note that the fold lines are etched on the inside of the inside of the base to assist in folding. At this point solder the bogie pivots (32x2) to the underside of the tender base. Now locate the back (2) into the tender base (1) and solder to the tender sides, working from inside the tender. Locate the tender front (3) into the tender base (1) and solder to the tender sides.

Fold the two reinforcing plates on each side valance (8xpair) as shown before fitting to the tender base (1). Fold the buffer beam (7) as shown and fit to the tender base (1), noting that the two vertical spigots form the lamp irons.

Fold the front steps (9) as shown. Fold up the edges of the front step treads (11x6 marked "A" on the back) and add to the front step (9), before fitting the completed step assembly to the tender, note that the two top steps attach to the tender body. Fold the front valance (10) as shown and fix to the tender.

Fold the tender floor (4) and fix to the tender front (3). Secure the drawbar pin (42) to the front valance (10). Fit the pipe couplings (31x2) either side of the side valances (8) before bending and fitting the pipes (0.7mm wire). Fit the brake cylinder (30) to the tender base.

Fix the turned brass side frame mounts (35x4) to the bogie side frames (33x4). For good electrical pickup low melt solder is recommended here. The bogie stretchers (38x2) are on the etched nickel silver valve gear fret -remove them and check that the holes either side fit over the

brass side frame mounts (35), you may need to enlarge the hole slightly. Check also that the holes for the screws (36x4) are large enough. Fold the stretchers as per drawing 1, using a pair of flat nosed (non-serrated) pliers.

Push the brass wheel bearings (34x8) in the bogie side frames using low melt solder if necessary, and attach the side frames to the stretcher with 0.4mm long brass spacer screws (36x4) and washers (37 x 4) (also from the nickel silver fret).

Tighten the screws then gently ease the side frames apart to fit the wheel sets (39x4) in place, making sure the insulated wheels are on the same side for each bogie - see drawing 1 (LS =live side), these wheels can be identified by the small brass collar between the wheel and axle.

Attach the assembled bogies to the tender using the spacer screws (41x2) and bogie bearing washers (40x2) making sure that the insulated wheels are on the R/H side.

Working (soldering) from inside the tender, fit the junction box (23), marker lamps (24x2), grab handle (0.4mm wire), and lamp iron (21). Fold the ladder (22) as shown and fit to the tender back. Fix the brake hose (27) to the buffer beam (7), followed by the buffers (25x2). Using 0.7mm wire fit the overflow pipe to the rear L/H side of the side valance (8). Repeat for the R/H side noting that the pipe fits to the front hole on the tender floor, then fit pipe connector (26) to the rear hole (R/H side only). Trim both overflow pipes to a length of 3.5mm to clear the bogies.

Drill the tender top (12) O.5mm on the front L/H side as shown for later fixing of the fire iron stand (19). Fit the toolbox (15), air vent (16) and water filler (17) to the tender top (12). Note that you will have to cutout a small section at the rear of the tender top (12) to clear the lamp iron (21). Now fit the tender top (12) to the tender body placing the rear section under the ladder uprights before final positioning of the tender top.

Fit the hungry boards (13x2) to the tender top (12), noting that the L/H hungry board has additional rivets to match the fire iron brackets (18x2). Fit the rear coal partition (14) to the tender top (12). Fold the coal chute (5) and fit to the tender front (3), then fold the coal doors (6) and fit to the tender front. Fit the brake handle (29) into the brake stand (28) and fix the assembly into the tender floor (4). Using 0.4mm wire fit the vertical handrails either side of the tender front.

Fit the fire iron standard (19) to the tender top (12) followed by the fire iron brackets (18x2) and fire irons (20x2).

## **Drawing 2 (Parts 43 - 84)**

As mentioned previously all holes shown on the drawings should be drilled prior to assembly. Clean out the two holes in the smokebox supports (just behind the front buffer beam) with a 0.7mm drill bit.

Clean up the footplate (43) and remove any feed sprues from the centre cutout under the boiler - take care not to remove the four valance support lugs. Fix the smokebox/boiler (46) to the firebox (45) then fit the completed assembly to the footplate (43), fixing at the rear, and using the spacer screw (47) at the front.

Because of later access problems it is recommended that the cab rear bulkhead (93) be fitted to the cab (44) before the cab is fitted to the firebox (45), and that the cab rear bulkhead handrails are fitted - refer to drawing 3. Fix the cab (44) to the footplate (43) ensuring that the cab is also secured to the firebox (45). Fix the buffer beam (48) to the footplate (43).

Fix the valance plates (54xpair) either side of the footplate (43) ensuring that they are level with top of the footplate. Add the footsteps (55x2) to the valance (54xpair).

Using 0.4mm wire make up and add the two handrails to the smokebox (53), followed by the smokebox door handle (65) and smokebox door step (66) before fitting the door to the smokebox/boiler (46). Note that the headlight should be fitted after the handrail. Commence detailing, fitting the chimney (51), dome (50), safety valve (59), steam generator (60 - add 0.5mm wire), whistle (58), safety valve (49) and junction box (56).

Fix the R/H marker lamp (67), pump (68), clack valve (64), pipe connection (63) and globe valve (57). Fix short handrail knobs (83x2), medium handrail knob (82), handrail/pipe bracket (61), pipe bracket (62) and short handrail knob (80). Working on the front of the cab fit the short handrail knobs (79x4) and the short handrail knobs (81x4).

This drawing also shows detailing of the front buffer beam (48) using the brake hose (69), buffers (70x2), dummy coupling (71), front step (72) and handrail post (73), however it is recommended that these parts be fitted later as they are vulnerable and subject to damage at this stage of assembly.

Fit the lamp irons (75x2) and the pump air filter (74). Fix the sandbox filler (76) to the R/H sandbox (77) and fix this assembly to the footplate (43). Before removing the pipe brackets (78x3) from the nickel silver fret and fitting them to the footplate, check that 0.7mm wire will pass easily through the hole in them.

### **Drawing 3 (Parts 85 - 113)**

Continue detailing the L/H side of the locomotive fitting the L/H marker lamp (101), junction box (102), clack valve (103) and pipe brackets (104x3). Fit the short handrail knobs (110x2), pipe fitting (100), long pipe brackets (109x2), medium pipe brackets (107x2), medium handrail knobs (108x2), short handrail knob (106), short pipe bracket (111), globe valve (95) and reversing gear cover (105). Fix the sandbox filler (99) to L/H sandbox (98) and fix this assembly to the footplate (43). Using the 0.7mm wire join the reversing rod (96) and reversing lever (97) and fix this assembly to the footplate (43).

Fit the air tank (85) to the rear of the footplate. Take the cab floor (89) and fold the two tabs down 90 degrees as shown. Take the fall plate (86) and fold the tabs down 90 degrees, then glue the plasticard (113) to the underside, trimming it so that it overlaps the three outside faces by 0.8mm to prevent it shorting out against the tender. Attach this to the cab floor (89) using 0.5mm wire as shown. Fit the completed assembly to the footplate. Fit the reversing hand wheel (91) and regulator (92) to the boiler and back head (90) and fit the completed assembly to the rear of the firebox. Fix the brake handle (87) into the brake stand (88) and fix the completed assembly in place. Add the cab seats (94x2) to complete the cab detail. Note that the spacer screws (112x2) are used later to secure the body to the chassis.

### **Drawing 4**

This drawing shows the wire and pipe layout to complete detailing the locomotive body. Note that the pump governor (114) is fitted to the R/H side, and that short handrail knob (84) should be added to the 0.4mm wire before the wire is shaped to the contour of the smokebox. The headlight (52) should be added after this section of handrail is fitted.

### **Drawing 5 (Parts 115 - 135)**

Note that this kit contains a pre-assembled motor/gearbox unit. This is a precision mechanism and must be handled with care. Lubricate only with plastic compatible oil such as La Belle 102, Peco Electrolube or Faller 489. Do not use "household " or "sewing machine" oils.

Test the gearbox by temporarily adding the axle gear (128) and axle (127). Check that axle (127) runs freely in the axle bushes (115x2) before securing the axle gear (128) with the grub screw (129). **Warning:** over-tightening the grub screw may result in shearing off the head. Apply power to the motor terminals to check that the gearbox runs freely. Remove the axle (127) and the axle gear (128) to allow later fitting of the gearbox to the chassis - be careful not to lose the grub screw !!

**This drawing is included for maintenance and spare part purposes**

### **Drawing 6 (Parts 136 - 169)**

Take the L/H frame (136) and R/H frame (142) and fold the rear tabs and front guard irons as shown on the drawing. Secure the two frames together using the spacers (138x2) and spacer screws (137x4) tightening these screws only enough to allow fitting of the front chassis fixing plate (139) folded as per drawing, keeper plate fixing plates (140x2) and insulator mounting plate (141) folding the tab as shown. Align the spacers (138x2) so that the cross hole is vertical and tighten the spacer screws (137x4). Solder the plates (139, 140x2 and 141) to the frames.

Fit the horn blocks (146x4) and centre horn blocks (147x2) to the chassis. Note that the thin flange of the horn block goes to the inside of the chassis and the centre horn blocks (147x2) have thinner outside flanges. The horn blocks are a "snap" fit into the chassis, and should not be soldered.

Before fitting the driving wheels (143x3 and 149x3) note that the insulated wheels are on the L/H side as viewed from the top facing forward. Note, the insulated driving wheels can be identified by the thin insulation strip between the tyre and the wheel. Fit the driving wheels (143x3 and 149x3), axles (147 and 148x2) and axle washers (145x6) to the chassis with the axle nuts (144x6), quartering the wheels so that the crank pin on the right hand wheel leads that of the left hand wheel by 90 degrees when the axle rotates forward. Use a Romford axle nut driver to tighten the axle nuts. Make sure that all axles rotate freely in the horn blocks. Remove the etched counter weights (151x2 centre axle and 152x4) from the fret and glue to the wheels as shown. Axle covers (150x6) should be fitted after the final assembly and painting.

Now fit drawbar/tender pickup placing the insulated bush (155) on the M2 screw (154) and pass this through the insulator mounting plate (141). Add the insulated washer (156), power tag (157), tender/locomotive connector (158), spring plate (159), spring (160 cut to 5.0mm) and M2 nut (161). The motor mounting block (153) should be fitted later, in conjunction with the motor/gearbox.

Make up the front bogie, fitting the wheel insert discs (165x4) to the bogie wheels (163x2) before fitting the wheels to the bogie (162) - note that the insulated wheels are on the L/H side of the bogie. Retain the wheels using the keeper plates (164x2). The front bogie is later fixed to the chassis using spring (166 cut to 7.0mm), spacing washer (167), spacing washer (168) and M2 nut (169).

### **Locomotive Drawing 7 (Parts 170 - 192)**

Fit the springs (171x4) to the keeper plate (170) before fitting the completed assembly to the locomotive chassis using the spacer screws (172x3). Pass four 22mm lengths of 0.7mm wire through the keeper plate and chassis rear before fitting the brake pull rods (176xpair). Fit the

front brakes (174x4) and rear brakes (173x2) followed by the brake shoes (175x6), then trim off the excess 0.7mm wire. Trim M2 screw (190) to 13mm and fix to the front chassis fixing plate (139) using M2 nut (191).

Make up the cylinders using cylinder blocks (179x2), front cylinder covers (180x2) and rear cylinder covers (181x2). Drill the rear cylinder covers 1.4mm to accept the crosshead and 0.9mm to accept the slide rod bars. Fit the drain cocks (184x2) to the bottom of the cylinder blocks. Fix the completed cylinder blocks to the chassis. Fix the coupling rods (177xpair) to the driving wheels using short crank pin screws (178x4) and long crank pin screws (189x2). Check that the rods revolve freely; should binding occur, locate where this happening and gently ease out the offending hole in the coupling rod with a rat-tail file, removing the minimum amount to achieve free movement.

Trim the crossheads (187xpair) to 15mm as shown and attach the connecting rods (186xpair) using the 14BA screws (185x2) and 14BA nuts (188x2). Fit the crossheads (187xpair) to the slide bars (183xpair) ensuring that they slide freely. Fold the slide bars (183xpair) as shown, locate the front spigot into the cylinders, and fix to the chassis. Fix the other end of the connecting rods (186xpair) to the centre driver using long crankpin screws (189x2). Check that the wheels and valve gear operate freely.

To fit the motor/gearbox unit, remove one coupling rod and one centre driving wheel and withdraw the centre axle. Position the motor/gearbox between the frames and locate axle gear (128), then replace axle (127) followed by centre driving wheel and coupling rod. Align the axle gear (128) before tightening the grub screw (129). Fix the motor mounting block (153) between the frames then use a small dab of silicon glue to retain the motor to the block.

Take two suitable lengths (approximately 30mm each) of pickup wire, solder to each motor terminal and mark the positive (+) lead, then solder this to the insulator mounting plate (141). Solder the other lead to the power tag (157).

Fit the locomotive body to the chassis using spacer screws (112x2) at the rear and M2 screw (192) at the front. Attach the front bogie as previously described in drawing 6.

Lightly oil the mechanism and test run, checking for electrical "shorts" on sharp curves etc. Also check that the motor does not overheat due to chassis binding/stiffness.

7 Feb 10

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## Drawing 1

1.	Base/Side	E
2.	Tender Back	E
3.	Tender Front	E
4.	Tender Floor	E
5.	Coal Chute	E
6.	Coal Doors	E
7.	Buffer Beam	E
8.	Side Valance x pair	E
9.	Front Steps	E
10.	Front Valance	E
11.	Step Treads x 6	E
12.	Tender Top	W/M
13.	Hungry Boards	E
14.	Rear Coal Partition	E
15.	Toolbox	W/M
16.	Air Vent	L/W
17.	Water Filler	W/M
18.	Fireiron Brackets x 2	E
19.	Fireiron Stand	E
20.	Fireirons x 2	E
21.	Lamp Iron	E
22.	Ladder	E
23.	Junction Box	L/W
24.	Marker Lamps x 2	L/W
25.	Buffers x 2	W/M
26.	Pipe Connector	L/W
27.	Brake Hose	L/W
28.	Brake Stand	L/W
29.	Brake Handle	L/W
30.	Brake Cylinder	W/W
31.	Pipe Couplings x 2	L/W
32.	Bogie Pivots x 2	T
33.	Bogie Side Frames x 4	W/M
34.	Pin Point Bearings x 8	T
35.	Bogie Side Frame Mounts x 4	T
36.	Spacer Screws x 4	T
37.	Sideframe Bearing Washers x 4	E
38.	Bogie Stretchers x 2	E
39.	Bogie Wheels 10.5mm x 4	T
40.	Bogie Bearing Washers x 2	E
41.	Bogie Mounting Screw x 2	T
42.	Drawbar	T

0.4mm dia. Wire

0.7mm dia. Wire

## Drawing 2

43.	Footplate	W/M
44.	Cab	W/M
45.	Firebox	W/M
46.	Smokebox/Boiler	W/M
47.	Spacer Screw	T
48.	Buffer Beam	W/M
49.	Safety Valve	L/W
50.	Dome	W/M
51.	Chimney	W/W
52.	Headlight	L/W
53.	Smokebox Door	W/M
54.	Valance Plates x Pair	E
55.	Footsteps x 2	W/M

56.	Junction Box	L/W
57.	Globe Valve	L/W
58.	Whistle	L/W
59.	Safety Valve	L/W
60.	Steam Generator	W/M
61.	Handrail Pipe Bracket	E
62.	Pipe Bracket	E
63.	Pipe Connection	L/W
64.	Clack Valve	L/W
65.	Smokebox Door Handle	L/W
66.	Smokebox Door Step	E
67.	R/H Marker Lamp	L/W
68.	Pump	W/M
69.	Brake Hose	L/W
70.	Buffers x 2	W/W
71.	Dummy Coupling	W/M
72.	Front Step	E
73.	Handrail Post	L/W
74.	Pump Air Filter	W/M
75.	Lamp Irons x 2	E
76.	Sandbox Filler	W/M
77.	R/H Sandbox	W/M
78.	Pipe Brackets x 3	E
79.	Short Handrail Knobs x 4	T
80.	Short Handrail Knob	T
81.	Short Handrail Knobs x 4	T
82.	Medium handrail Knob	T
83.	Short Handrail Knobs x 2	T
84.	Short Handrail Knob	T

0.4mm dia. Wire

0.5mm dia. Wire

## Drawing 3

85.	Air Tank	W/M
86.	Fall Plate	E
87.	Brake Handle	L/W
88.	Brake Stand	W/M
89.	Cab Floor	E
90.	Boiler Backhead	W/M
91.	Reversing Handwheel	L/W
92.	Regulator	L/W
93.	Cab Rear Bulkhead	E
94.	Cab Seats x 2	W/M
95.	Globe Valve	L/W
96.	Reversing Rod	E
97.	Reversing Lever	E
98.	L/H Sandbox	W/M
99.	Sandbox Filler	W/M
100.	Pipe Fitting	L/W
101.	L/H Marker Light	L/W
102.	Junction Box	L/W
103.	Clack Valve	L/W
104.	Pipe Brackets x 3	E
105.	Reversing Gear Cover	W/M
106.	Short Handrail Knob	T
107.	Medium Pipe Brackets x 2	E
108.	Medium Handrail Knobs x 2	T
109.	Long Pipe Brackets x 2	E
110.	Short Handrail Knobs x 2	T
111.	Short Pipe Bracket	E

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109.	Long Pipe Brackets x 2	E
110.	Short Handrail Knobs x 2	T
111.	Short Pipe Bracket	E
112.	Spacer Screws x 2	T
113.	Plasticard	P

0.4mm dia. Wire  
0.5mm dia. Wire  
0.7mm dia. Wire

## Drawing 4

114.	Pump Governor	L/W
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0.4mm dai. Wire  
0.5mm dia. Wire  
0.7mm dia. Wire

## Drawing 5

115.	Axle Bushes x 2	T
116.	L/H Gearbox Frame	E
117.	R/H Gearbox Frame	E
118.	Motor	-
119.	Motor Fixing Bracket	E
120.	Motor Fixing Screws x 2	T
121.	Stepped Axle	T
122.	Stepped Gear	P
123.	Spacing Washer	E
124.	Stepped Axle	T
125.	Toothed Gear	T
126.	Spacing Sleeve	T
127.	Axle	T
128.	Axle Gear	T
129.	Grub Screw	T
130.	Fixing Screws x 5	T
131.	Short Gearbox Spacer x 2	T
132.	Bearing Plate	E
133.	Long Gearbox Spacer	T

134.	Short Gearbox Spacers x 2	T
135.	Bearing Bush	T

## Drawing 6

136.	L/H Frame	E
137.	Spacer screws x 4	T
138.	Spacers x 2	T
139.	Front Chassis Fixing Plate	E
140.	Keeper Plate Fixing Plates x 2	E
141.	Insulating Mounting Plate	E
142.	R/H Frame	E
143.	20mm Non-Insulated Driving Wheels x 3	T
144.	Axle Nuts x 6	T
145.	Axle Washers x 6	E
146.	Hornblocks x 4	T
147.	Centre Hornblocks	T

148.	Axles x 2	T
149.	20mm Insulated Driving Wheels x 3	T
150.	Axle covers x 6	E
151.	Large Balance Weights x 2	E
152.	Small Balance Weights x 4	E
153.	Motor Mounting Block	W/M
154.	M2 x 8mm C/H Screw	T
155.	Insulated Bush	P
156.	Insulated Washer	P
157.	Power Tag	E
158.	Tender/Locomotive Connector	E
159.	Spring Plate	E
160.	Spring	-
161.	M2 Nut	T
162.	Bogie	W/M
163.	10.5mm Bogie Wheels x 2	T
164.	Keeper Plates x 2	W/M
165.	Wheel Insert Discs x 4	E
166.	Spring	-
167.	Spacing Washer	E
168.	Spacing Washer	E
169.	M2 Nut	T

0.7mm Dia. Wire  
Insulated Wire

## Drawing 7

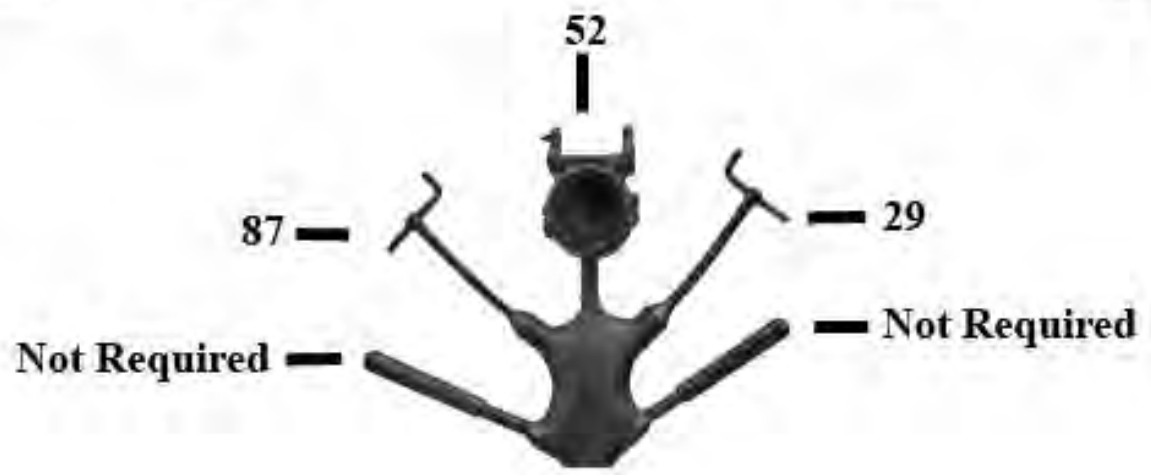
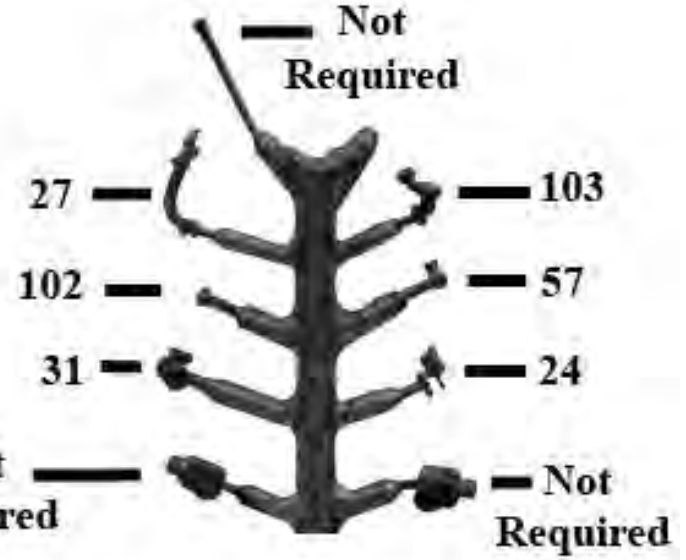
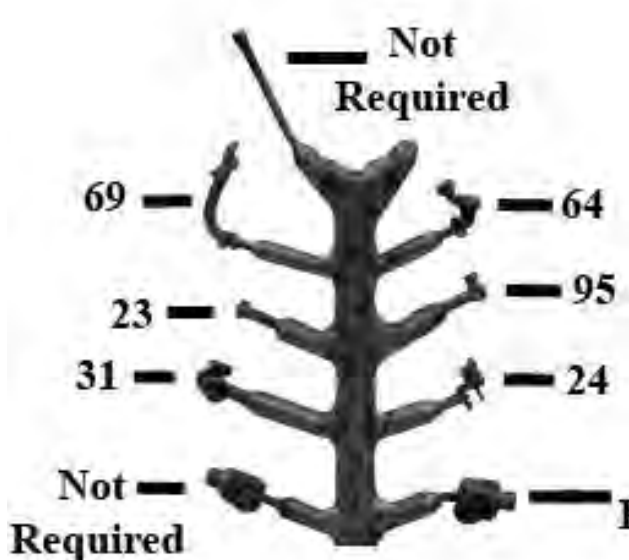
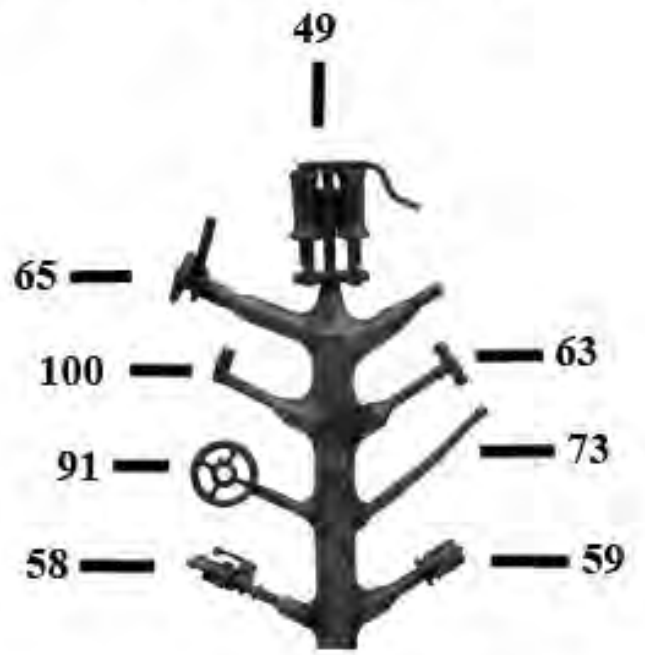
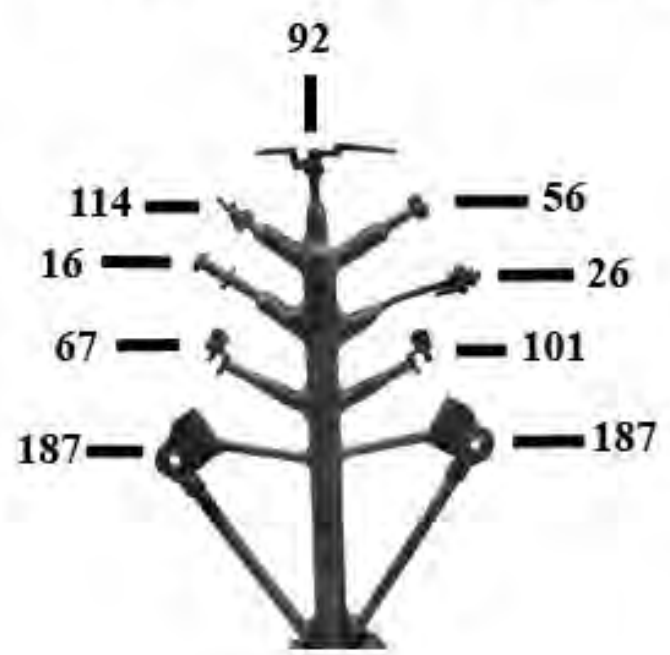
170.	Keeper Plate	W/M
171.	Springs x 4	W/M
172.	Spacer Screws x 3	T
173.	Rear Brakes x 1 Pair	E
174.	Front Brakes x 2 Pairs	E
175.	Brake Shoes x 3 Pairs	E
176.	Brake pull Rods x 1 Pair	E
177.	Coupling Rods x 1 Pair	E
178.	Short Crankpin Screws x 4	T
179.	Cylinder Blocks x 2	W/M
180.	Front Cylinder Covers	W/M
181.	Rear Cylinder Covers x 2	W/M
182.	No Part	
183.	Slide Bars x 1 Pair	E
184.	Draincocks x 2	E
185.	14BA x 1/8" C/H Screws x 2	T
186.	Connecting Rods x 1 Pair	E
187.	Crossheads x 1 Pair	L/W
188.	14 BA Nuts x 2	T
189.	Long Crankpin Screws x 2	T
190.	M2 16mm C/H Screw	T
191.	M2 Nut	T
192.	M2 x 8mm C/H Screw	T

0.7mm dia. Wire

### Legend:

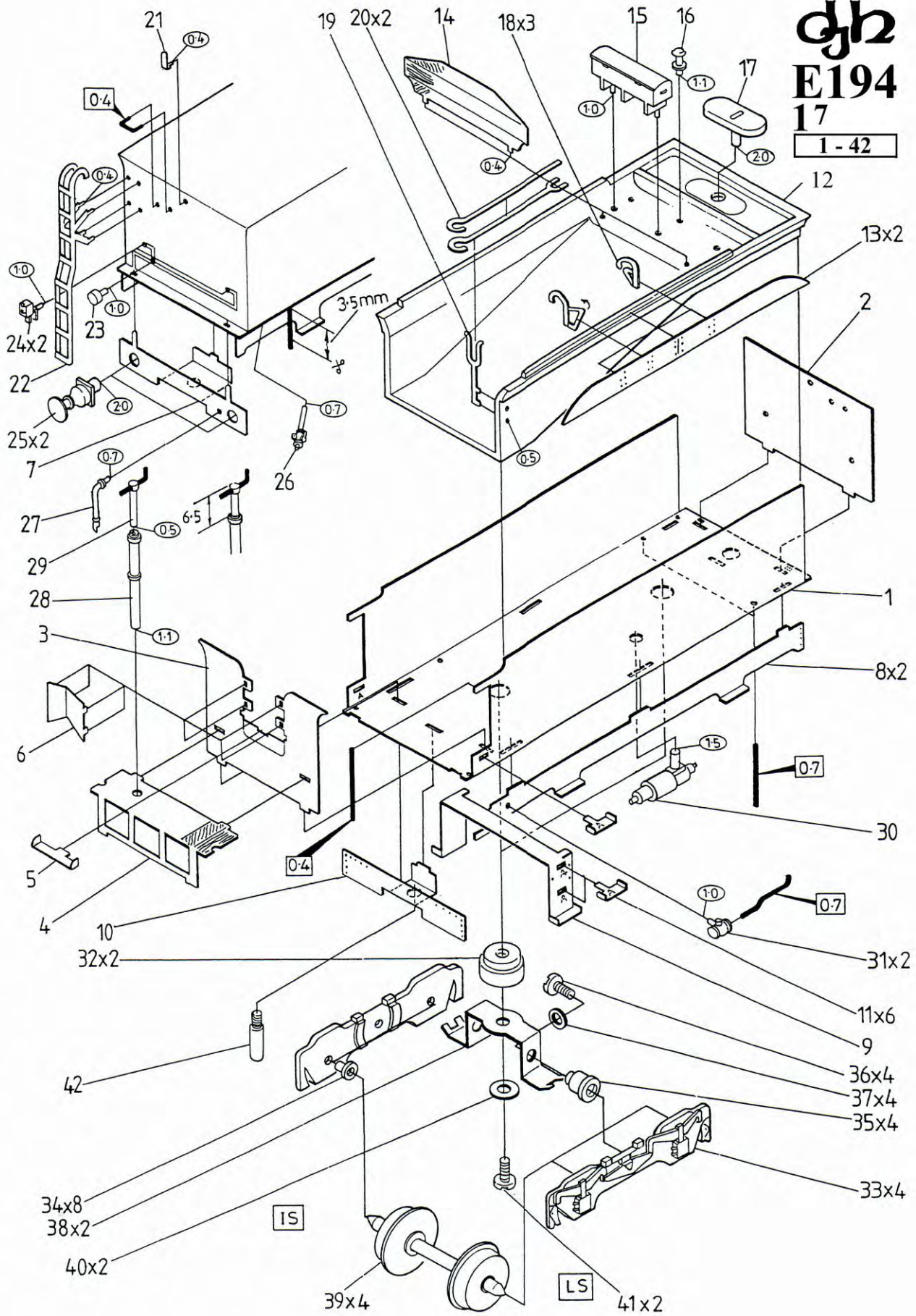
W/M = White Metal  
E = Etched Brass  
L/W = Lost Wax Brass Casting  
T = Turning  
P = Plastic

# (E194) - C35 - Lost Wax Brass Castings

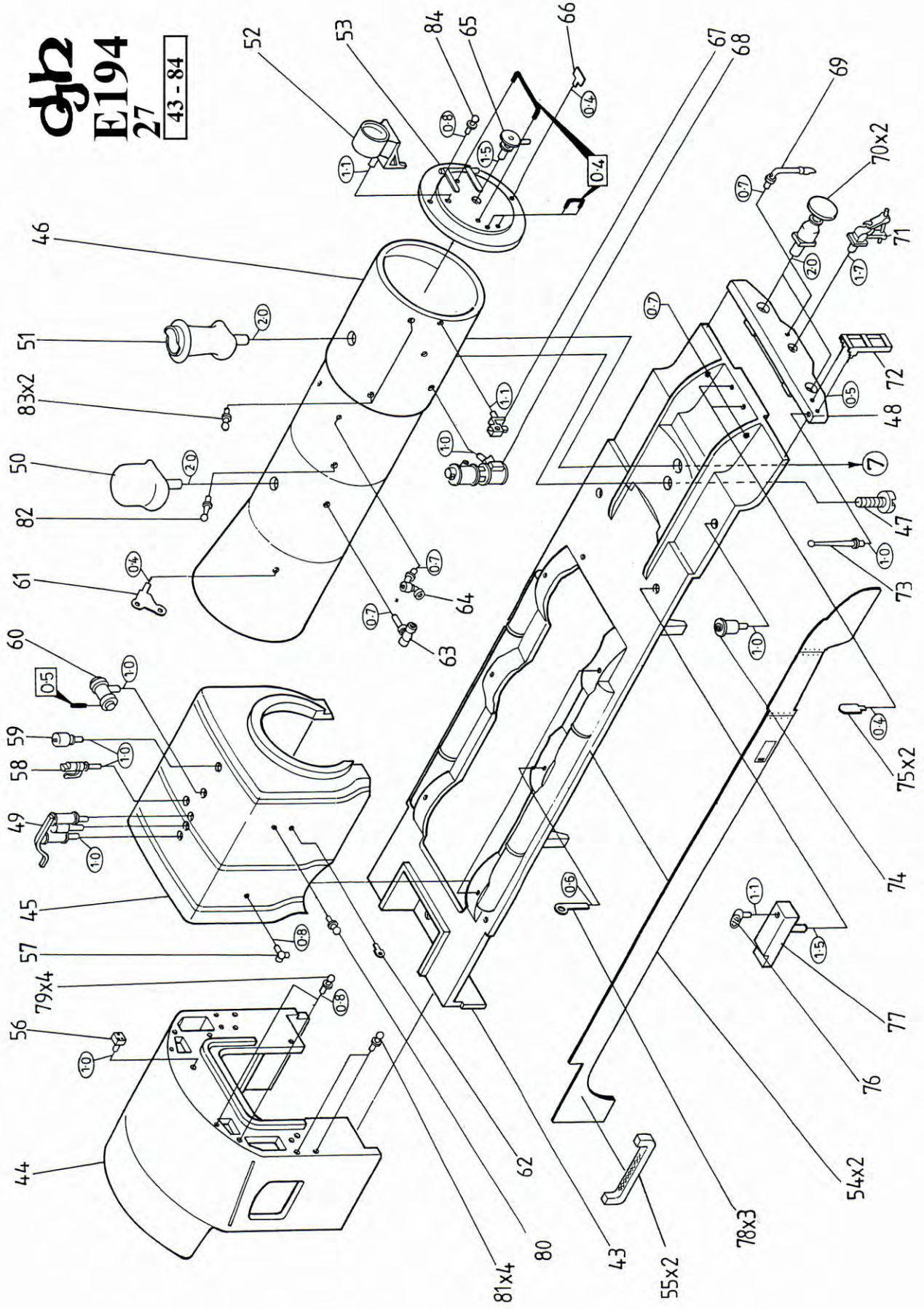




**dh**  
**E194**  
**17**  
**1-42**



**gpr**  
**E194**  
**27** 43 - 84

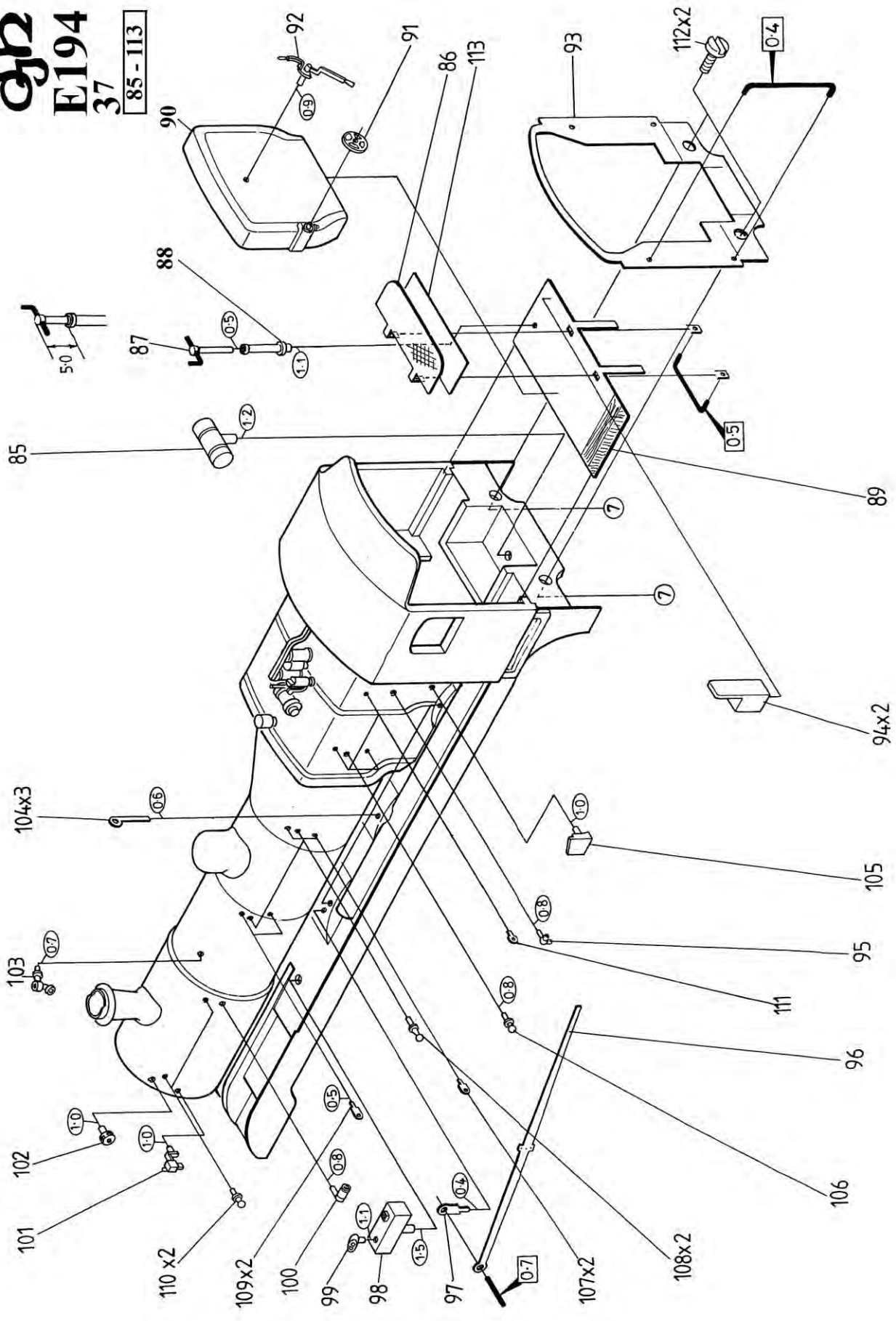


# gib

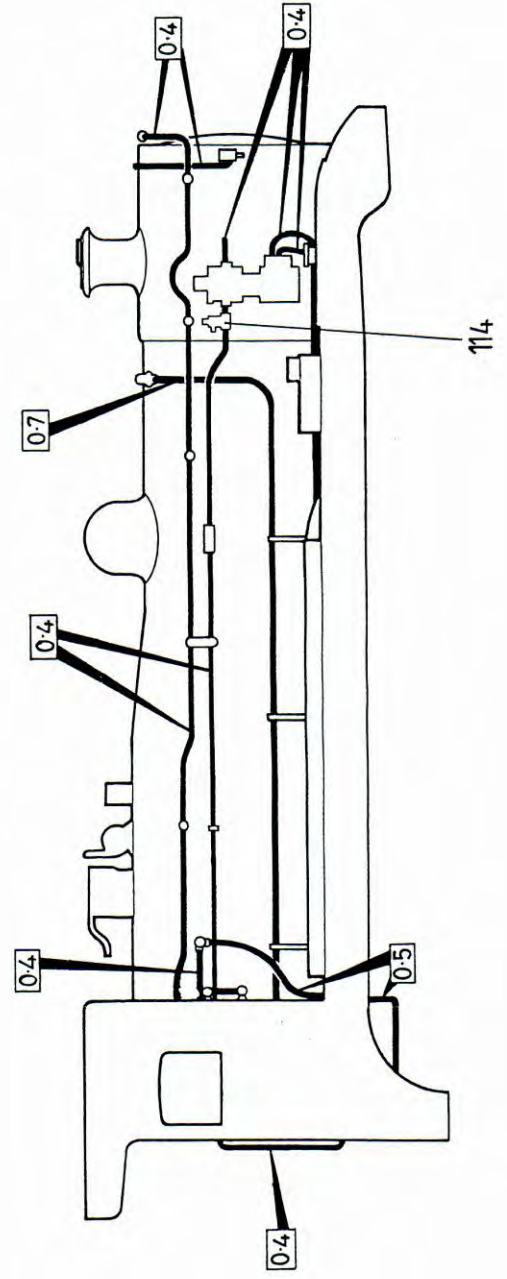
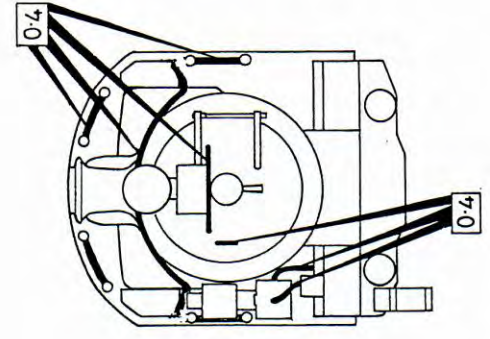
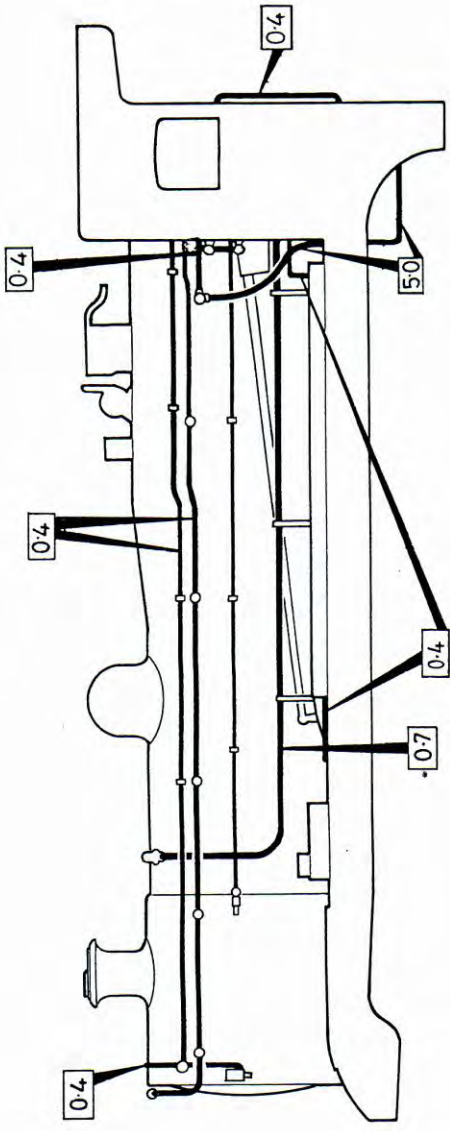
## E194

### 37

85-113

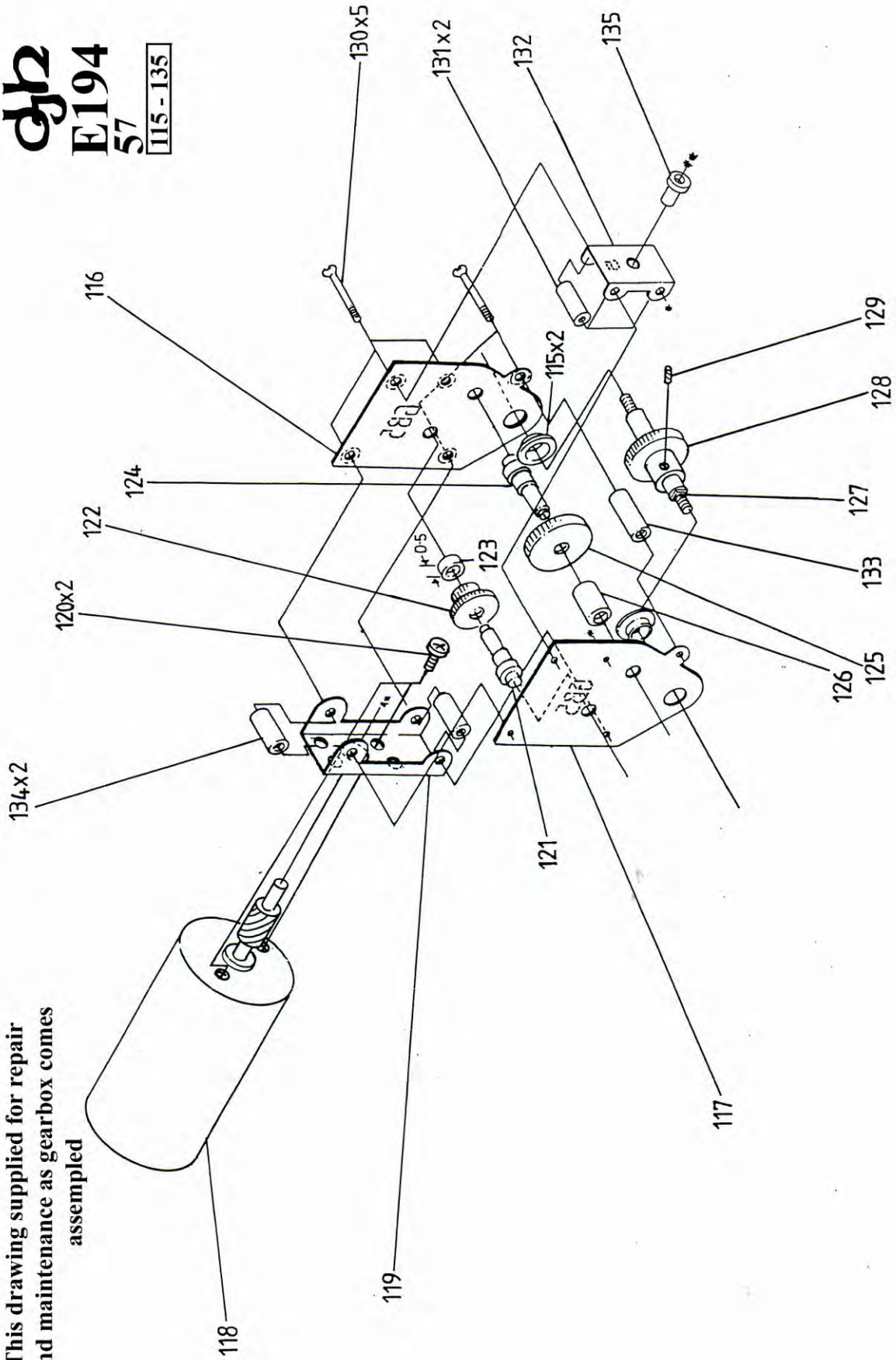


**ghz**  
**E194**  
**47** 114

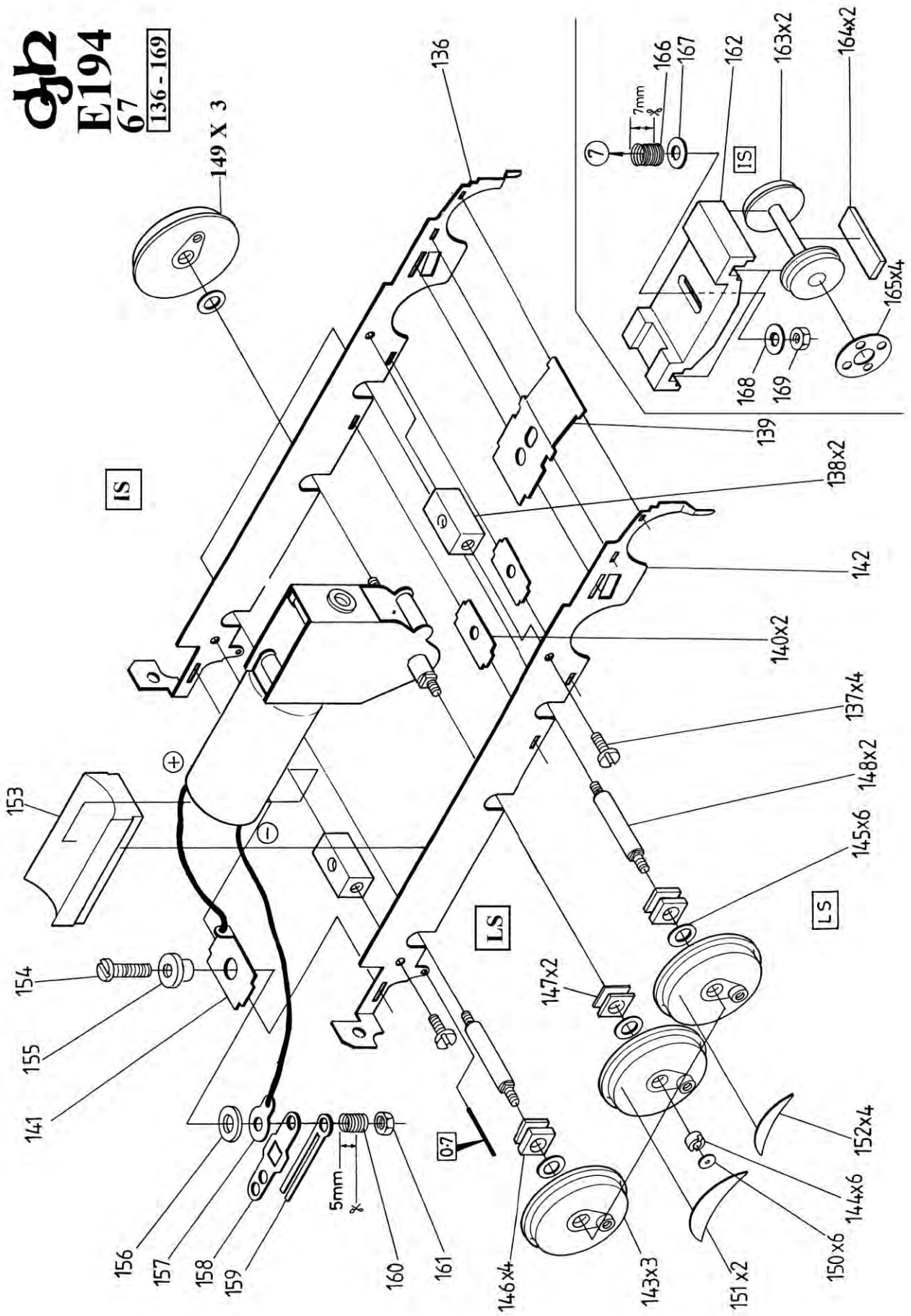


This drawing supplied for repair  
and maintenance as gearbox comes  
assembled

**gjb**  
**E194**  
**57**  
**115 - 135**



**djb**  
**E194**  
**67**  
**136 - 169**



**qjz**  
**E194**  
**77**  
**170 - 192**

