

ASSEMBLY INSTRUCTIONS

Kit contains parts for:

LMS Built Locomotives
LMR (BR) Built Locomotives
BR Standard Locomotives

BODY CONSTRUCTION

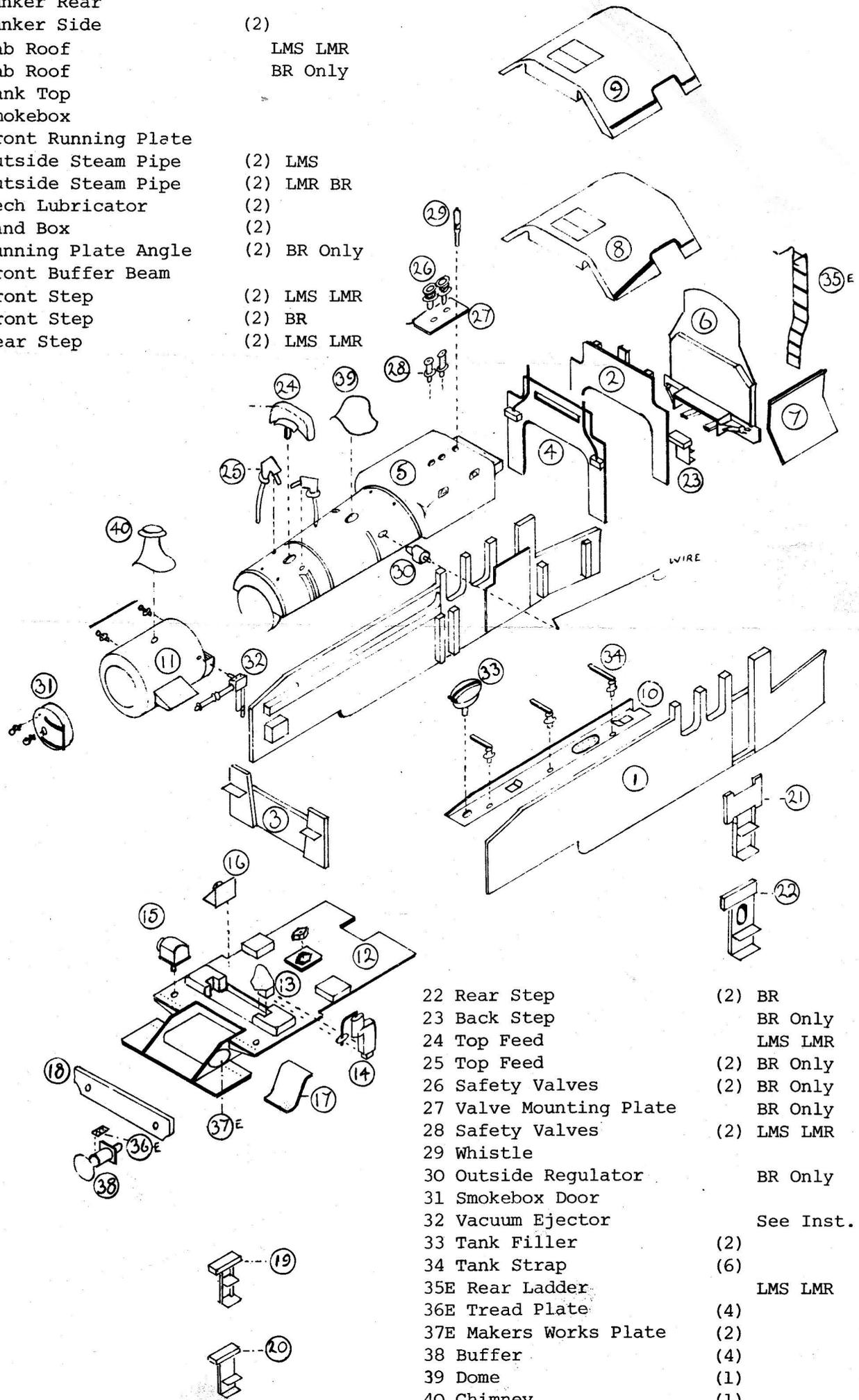
Check castings and remove sprues and flash, being careful not to destroy the detail. Check squareness and fits of the main body parts by having a dummy run prior to final assembly. Castings should be carefully filed as appropriate to achieve best possible fits, unintentional gaps in the finished assembly can be filled using a suitable proprietary metal filler. Part numbers suffixed 'E' in the check list are to be found on the etched valve gear fret.

1. Glue together tank sides (1) cab rear (2) and tank front (3) taking particular care to ensure squareness and allow to set thoroughly before commencing.
2. Fit cab front (4) and cab roof (8) - LMS/LMR or (9) BR Standard.
3. Read note 7e before carrying out this instruction.
Ensure close fit of firebox/boiler (5) to cab front and fix in position followed by tank tops (10) equalising gaps between boiler and tanks.
4. Fit bunker rear (6) and bunker sides (7) to obtain close fit of bunker sides it may be necessary to gently ease and equalise the angled rear part of the side sheets.

Note: Bunker rear - BR Standard locomotives had 5 steps as cast with back step (23) and handrails but no ladder. LMS/LMR locomotives had only one centre step and ladder (35e). The remaining four outer steps should be carefully removed.

5. Glue 8BA nut into position cast in top of front running plate (12).
The smokebox (11) should now be positioned but not fixed to the front running plate (12) and the whole offered up to the body. The running plate underside should be level with the bottom of the tank sides and the heights of the boiler and smokebox compared. Alignment is achieved by packing or removing metal from the underside of the saddle. Glue the smokebox to the running plate and the whole to the body in that order.
6. Footplate angle (17) fitted to BR Standard locomotives should be blended to fill gap between the two running plate levels after removing metal from running plate as indicated by scribed lines on underside.
7. The remaining details can be fitted in any order but the following should be noted:-
 - (a) Sandboxes (16) fit adjacent to the tank fronts close to the boiler.
 - (b) Tank straps (34) need to be cut to length accordingly.
 - (c) Mechanical lubricators (15) are fitted with the longer of the two to the nearside.
 - (d) Safety Valves - BR Standard (26) are mounted on plate (27)
LMS/LMR (28) are taller than the BR pattern and have no mounting plate.
 - (e) Top Feed - BR Standard (25) - file away the cast pipes on the boiler. LMS/LMR (24) - no alteration required.
 - (f) Outside regulator gland (30) - BR Standard only, use wire for regulator rod. Fill hole in boiler for LMS/LMR locomotives.
 - (g) Rear ladder (35e) - use unwanted parts of etched valve gear fret to make brackets.

- 1 Tank Side Sheet (2)
- 2 Cab Rear LMS LMR
- 3 Tank Front BR Only
- 4 Cab Front
- 5 Firebox/boiler
- 6 Bunker Rear
- 7 Bunker Side (2)
- 8 Cab Roof
- 9 Cab Roof
- 10 Tank Top
- 11 Smokebox
- 12 Front Running Plate
- 13 Outside Steam Pipe (2) LMS
- 14 Outside Steam Pipe (2) LMR BR
- 15 Mech Lubricator (2)
- 16 Sand Box (2)
- 17 Running Plate Angle (2) BR Only
- 18 Front Buffer Beam
- 19 Front Step (2) LMS LMR
- 20 Front Step (2) BR
- 21 Rear Step (2) LMS LMR



- 22 Rear Step (2) BR
- 23 Back Step BR Only
- 24 Top Feed LMS LMR
- 25 Top Feed (2) BR Only
- 26 Safety Valves (2) BR Only
- 27 Valve Mounting Plate BR Only
- 28 Safety Valves (2) LMS LMR
- 29 Whistle
- 30 Outside Regulator BR Only
- 31 Smokebox Door See Inst.
- 32 Vacuum Ejector
- 33 Tank Filler (2)
- 34 Tank Strap (6)
- 35E Rear Ladder LMS LMR
- 36E Tread Plate (4)
- 37E Makers Works Plate (2)
- 38 Buffer (4)
- 39 Dome (1)
- 40 Chimney (1)
- Handrail Knobs (10)

CHASSIS CONSTRUCTION

Study the diagram thoroughly before commencing. Since the valve gear has been accurately scaled, clearances are small, demanding close attention to assembly detail to ensure a free moving end result. Some assemblies are fitted to the chassis and then removed for later re-fitting to enable the valve gear to be assembled and checked unhindered.

Parts (1) to (11) inclusive are to be found on the etched valve gear fret.

1. Fit axle bearings (12) to side frames (13) with flanges to the outside (same side as hole countersinks).
2. Using 2 off 8 BA x $\frac{1}{8}$ " countersunk screws fit chassis spacer (14) (the one with the 6 BA clearance cross hole for motor fixing) to the centre countersunk holes in the side frames.
3. Fix front chassis block halves (15) and support block (16) together aligning the cross slot. Clean out slot with fine slotting saw if necessary. Check fit of assembly with underside of front running plate, file square locating pads as required.
4. Fit front chassis block to side frames using spacer (17) and 2 off 8BA x $\frac{1}{8}$ " countersunk screws aligning cross hole vertically for later fixing of pony truck.
Note: The front of the side frames have the countersunk holes nearest to the leading edge.
5. Assemble rear chassis block (18) similarly and fit sand boxes (19).
6. Fit driving wheels (20) and axles (21) using cheese head screws (22). The axles are already quartered to ensure that opposing crankpins are at 90° . The wheels having the long crankpins are the centre drivers. The driving gear is fitted to the centre axle.
7. Fit coupling rods (23) with $\frac{1}{4}$ BA nuts to all but the centre drivers and check for free running. Tight spots can be eliminated by carefully increasing the clearances between the rod holes and crankpins of the end drivers using a jeweller's rat tail file after ensuring equal relative positions of crank pins of all drivers. Relative positions of crankpins can be altered marginally by gently easing the wheel on its axle to take advantage of the small clearances in the quartering 'D's before final tightening. When satisfactory, nuts should be filed thin and touched with solder.
8. Assemble current collector (see sketch) soldering leads to bronze strips which must be bent to contact the driving wheel rims. Ensure clearance between strips and chassis. Remove assemble for later fixing.
9. Assemble bogie wheels to pony trucks (24) using retaining plate (25). Position to chassis and check clearance between wheels and chassis. File as necessary and remove for later fixing.
10. Solder worm gear to motor spindle on the end nearest the brushes. Fit motor using 6 BA x $\frac{1}{4}$ " cheese head screws through the centre chassis spacer to the leading tapped hole in the motor frame - do not over-tighten. Rotate the motor and spacer until the gears mesh satisfactorily. File motor support wedge (26) to suit and glue only to rear chassis block at rear end of motor. Remove motor for later fixing.

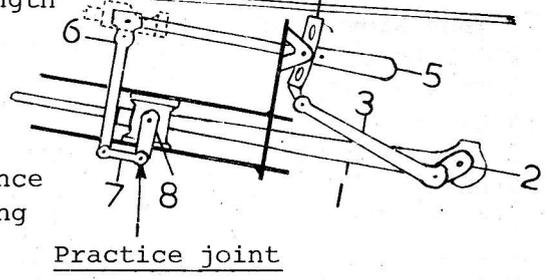
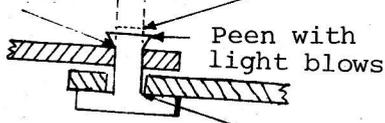
VALVE GEAR

This is best built up as a complete assembly separately from the chassis until final fixing and adjustments.

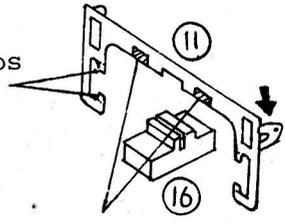
11. Before removing valve gear parts from the fret, check fits of rivets and screws and open up the holes as required (see sketch on pivot joints) using a jeweller's rat tail file. The hole in the large end of return crank (2) is ready tapped 12 BA for subsequent screwing to centre driver crankpins. Remove parts from the fret and file away unwanted tabs.
Lay parts out on the bench in their relative positions in order to maintain the correct relationship of parts in LH and RH assemblies.
12. Great care must be taken with the rivetting operations to ensure free pivots. It is best to start with the 'practice joint' (indicated on sketch) since this will subsequently be locked.
 - (a) Rivet drop link (8) union link (7) combination lever (6) and radius rod (5).
 - (b) Rivet motion link (4) eccentric rod (3) and return crank (2). Return crank (2)

- and drop link (8) can be slightly cranked to assist clearance with adjacent parts.
13. Glue crosshead guide bars (27) to locations on cylinder stretcher (28).
 14. Make up crosshead assemblies comprising connecting rod (1) outside and inside crosshead plates (9) and (10) and piston rod (29) using 14 BA x $\frac{1}{8}$ " screw with nut to the outside. Do not cut screw off to length yet.
 15. Check free motion of crosshead between guide bars and glue cylinder covers (30) to stretcher, re-check motion when thoroughly set. Glue valve rod guides (31) to cylinders.
 16. Take guide bar support stretcher (11) file clearances for front drivers (shown shaded in the sketch) and carefully bend motion link brackets (arrowed in diagram) 90° towards the rear. Also bend solder tabs for guide bars 90° towards the front. Position guide bar stretcher in chassis slot, hold cylinder stretcher on chassis location, check squareness and mark required length of guide bars. Cut to length and solder guide bars to stretcher tabs filing away excess solder and sharp edges.
 17. Dismantle crossheads and re-assemble with drop link (8) at 90° to the guide bars, a small application of solder should be used to prevent the drop link from subsequently rotating on crosshead plate (9). Cut off excess screwthread, 'thin' the nut and lock with solder.
 18. Position brass rivet (head to the outside) through stretcher pivot bracket (arrowed in diagram), through centre hole of motion link (4), through the forward hole of radius rod (5) and solder to the inside. File off any excess length.
 19. Check free movement of pivots and crossheads and position complete assembly to chassis with connecting rods to centre driver crankpins and screw on ready topped return crank (2). Set relative position of return crank to driving wheel crank and lock with solder.
 20. Check general alignment of valve gear assembly and secure cylinder and guide bar stretchers to chassis. Cylinders and guide bars are inclined at 1 in 20 relative to the running plate. Set required angle of union link (7) to drop link (8) (approx. 90°) and lock pivot with solder. Centralise leading pair of drivers and minimise end float by easing out the axle bushes, lock in position with solder. This ensure equal clearances on both sides between wheel crankpin nuts and inside of valve gear assembly.
 21. Re-fit assemblies previously removed to assist valve gear assembly and fit body to chassis, by clipping rear end into box section on back buffer beam then 8 BA screw through front casting into 8 BA nut already secured to top of front footplate casting.

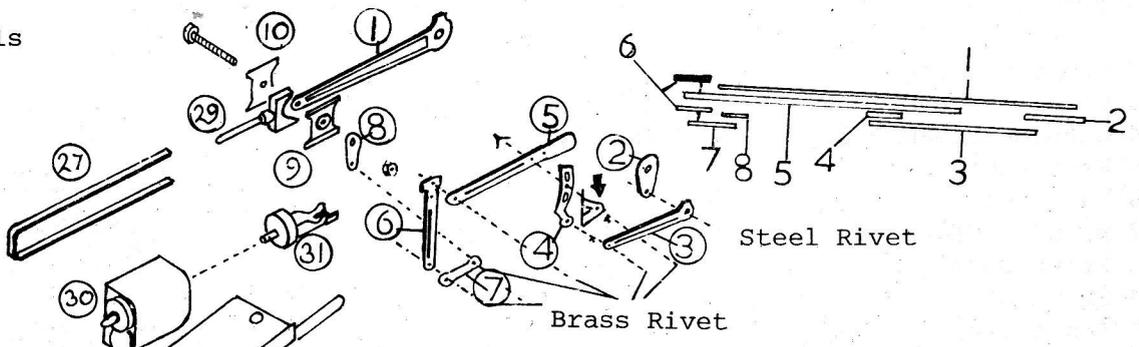
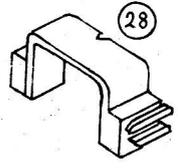
Minimum hole clearance



Solder tabs



File clearance for front driving wheels



CHECK LIST

- 1 Connecting Rod (2)
- 2 Return Crank (2)
- 3 Eccentric Rod (2)
- 4 Motion Link (2)
- 5 Radius Rod (2)
- 6 Combination Lever (2)
- 7 Union Link (2)
- 8 Drop Link (2)
- 9 Crosshead Plate Outer (2)
- 10 Crosshead Plate Inner (2)
- 11 Guide Bar Stretcher (2)
- 12 Axle Bearing (6)
- 13 Chassis Side Frames (2)
- 14 Centre Chassis Spacer (2)
- 15 Front Chassis Block Halves (2)
- 16 Support Block (2)
- 17 Chassis Spacer (2)
- 18 Rear Chassis Block Halves (2)
- 19 Sand Boxes (2)
- 20 Driving Wheel (6)
- 21 Axle (3)
- 22 Driving Wheel Screw (6)
- 23 Coupling Rod (2)
- 24 Pony Truck (2)
- 25 Retaining Plate (2)
- 26 Motor Wedge (2)
- 27 Guide Bars (2)
- 28 Cylinder Stretcher (2)
- 29 Piston Rod (2)
- 30 Cylinder Cover (2)
- 31 Valve Rod Guide (2)

Brass and Steel rivets
Motor
Worm and Drive Gear
Current Collector Mouldings
Phosphor Bronze Strip

- 14 BA x 3/8" screws (2)
- 14 BA Nuts (6)
- 8 BA x 1/8" Screws c/sunk (6)
- 6 BA x 1/4" Screw (1)
- 8 BA x 1/2" Screws c/sunk (1)
- 8 BA x 3/4" Screw (2)
- 8 BA Nuts (5)
- Bogie Wheel and Axle (2)



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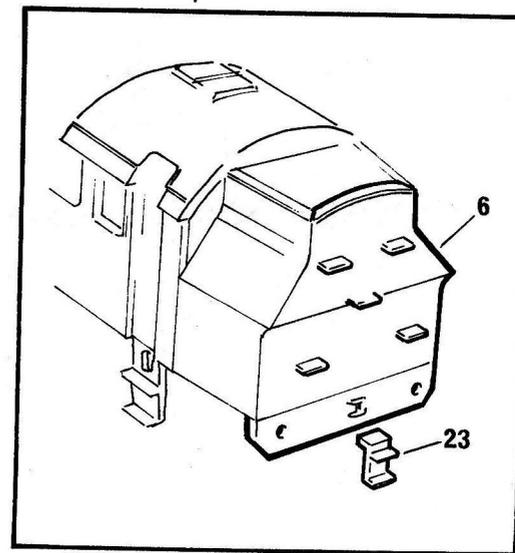
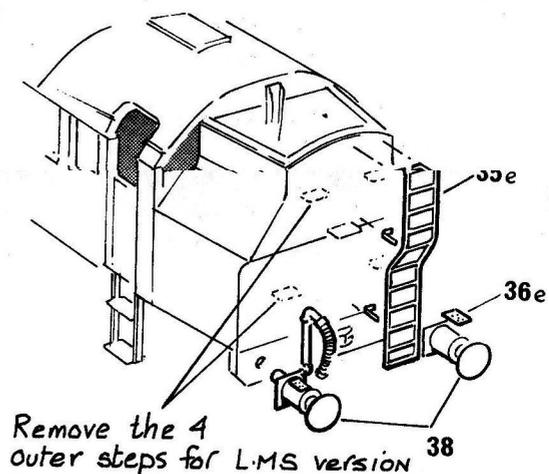
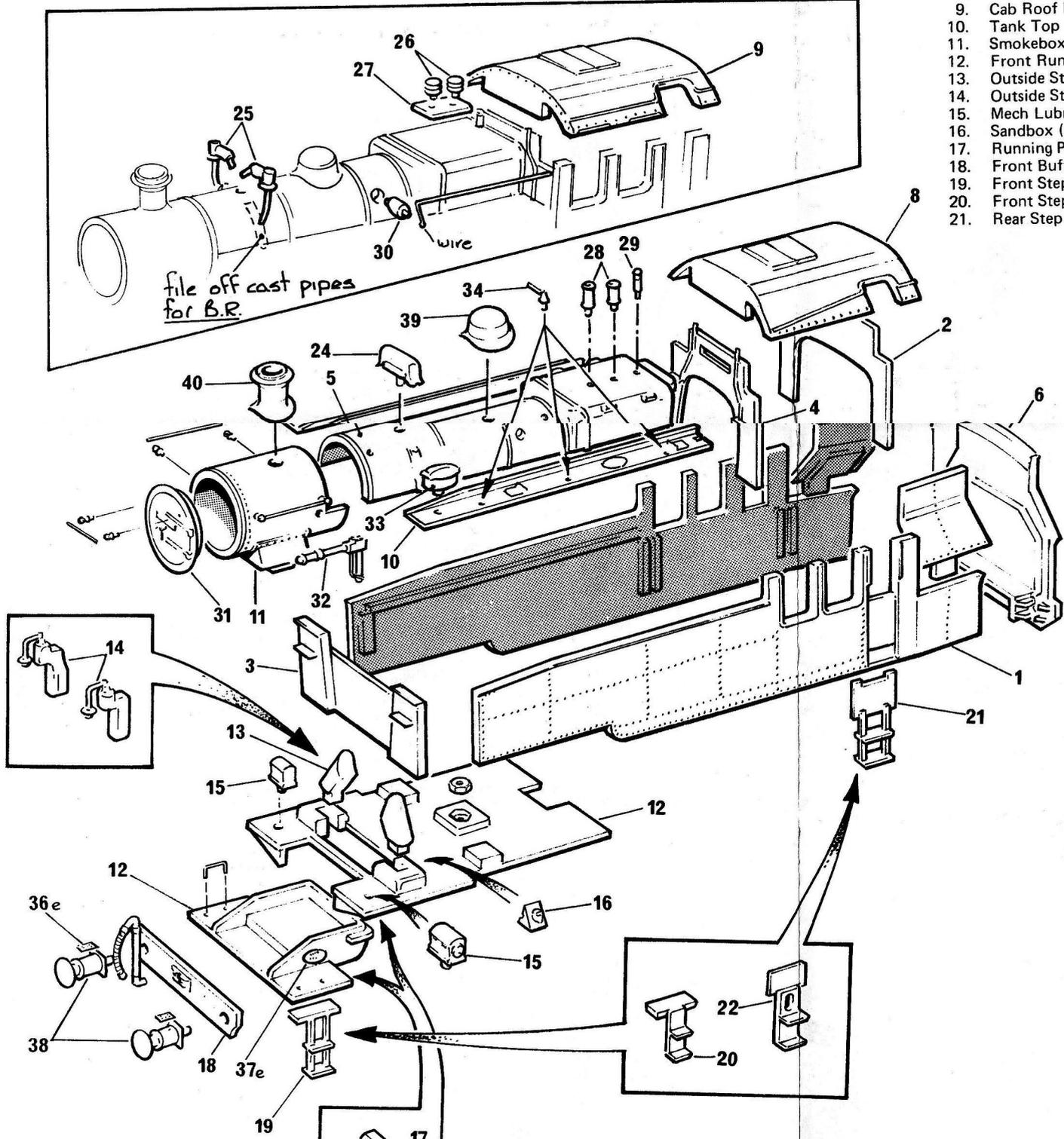
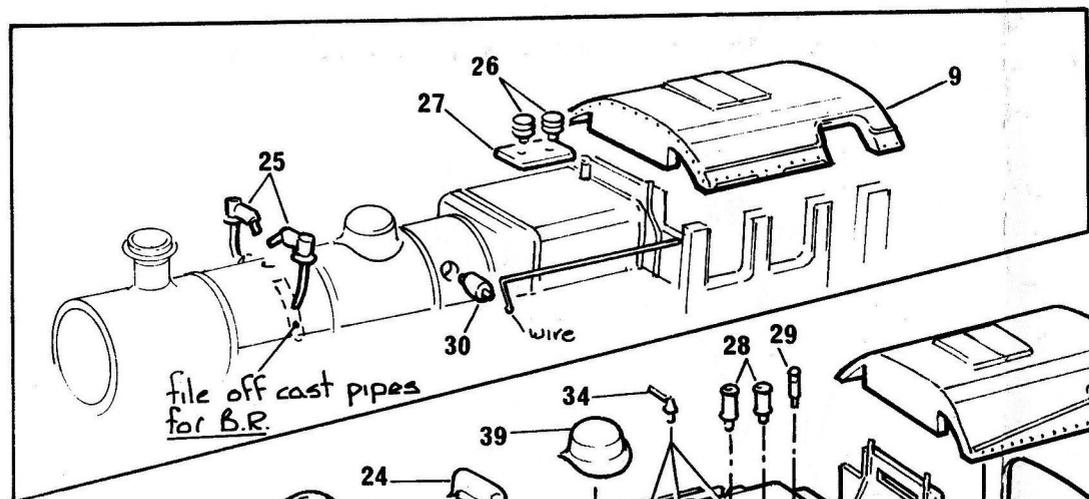


L.M.S(BR) IVATT 2-6-2T... superstructure

note:- main assembly illustration LMS -BR.variants in 'boxes'

SUPERSTRUCTURE CHECK LIST

- | | |
|--------------------------------------|----------------------------------|
| 1. Tank Side Sheet (x2) | 22. Rear Step (x2) BR |
| 2. Cab Rear | 23. Back Step BR only |
| 3. Tank Front | 24. Top Feed LMS, LMR |
| 4. Cab Front | 25. Top Feed (x2) BR only |
| 5. Firebox/boiler | 26. Safety Valves (x2) BR only |
| 6. Bunker Rear | 27. Valve Mounting Plate BR only |
| 7. Bunker Side (x2) | 28. Safety Valves (x2) LMS, LMR |
| 8. Cab Roof LMS, LMR | 29. Whistle |
| 9. Cab Roof BR only | 30. Outside Regulator BR only |
| 10. Tank Top | 31. Smokebox door |
| 11. Smokebox | 32. Vacuum Ejector, See Inst. |
| 12. Front Running Plate | 33. Tank Filler (x2) |
| 13. Outside Steam Pipe (x2) LMS | 34. Tank Strap (x6) |
| 14. Outside Steam Pipe (x2) LMR BR | 35e. Rear Ladder LMS, LMR |
| 15. Mech Lubricator (x2) | 36e. Tread Plate (x4) |
| 16. Sandbox (x2) | 37e. Makers Works Plate (x2) |
| 17. Running Plate Angle (x2) BR only | 38. Buffer (x4) |
| 18. Front Buffer Beam | 39. Dome (x1) |
| 19. Front Step (x2) LMS, LMR | 40. Chimney (x1) |
| 20. Front Step (x2) BR | |
| 21. Rear Step (x2) LMS, LMR | |



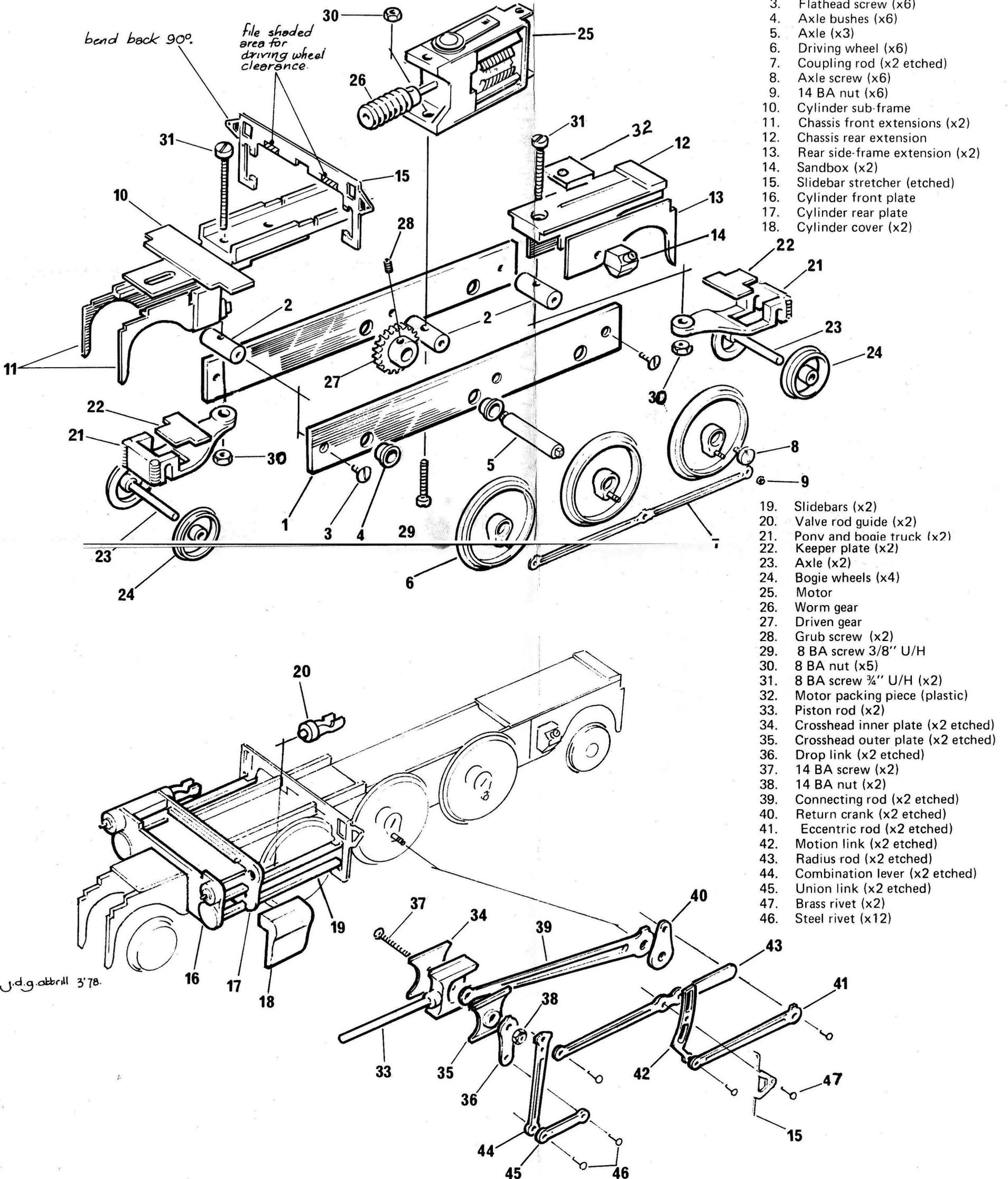
Note:- to fit item 17, remove metal between the two scribed lines below the running plate items 12.



L.M.S (B.R.) IVATT 2.6.2T

chassis

CHASSIS PARTS LIST



1. Side frame (x2)
2. Chassis spacer (x3)
3. Flathead screw (x6)
4. Axle bushes (x6)
5. Axle (x3)
6. Driving wheel (x6)
7. Coupling rod (x2 etched)
8. Axle screw (x6)
9. 14 BA nut (x6)
10. Cylinder sub-frame
11. Chassis front extensions (x2)
12. Chassis rear extension
13. Rear side-frame extension (x2)
14. Sandbox (x2)
15. Slidebar stretcher (etched)
16. Cylinder front plate
17. Cylinder rear plate
18. Cylinder cover (x2)
19. Slidebars (x2)
20. Valve rod guide (x2)
21. Ponv and bogie truck (x2)
22. Keeper plate (x2)
23. Axle (x2)
24. Bogie wheels (x4)
25. Motor
26. Worm gear
27. Driven gear
28. Grub screw (x2)
29. 8 BA screw 3/8" U/H
30. 8 BA nut (x5)
31. 8 BA screw 3/4" U/H (x2)
32. Motor packing piece (plastic)
33. Piston rod (x2)
34. Crosshead inner plate (x2 etched)
35. Crosshead outer plate (x2 etched)
36. Drop link (x2 etched)
37. 14 BA screw (x2)
38. 14 BA nut (x2)
39. Connecting rod (x2 etched)
40. Return crank (x2 etched)
41. Eccentric rod (x2 etched)
42. Motion link (x2 etched)
43. Radius rod (x2 etched)
44. Combination lever (x2 etched)
45. Union link (x2 etched)
47. Brass rivet (x2)
46. Steel rivet (x12)

Note:- Valve gear (items 33 to 47) has been drawn over size for clarity.