MIDDLETON RAILWAY. NOTES ON PERMANENT WAY.

These notes are to help volunteers in understanding correct names of components, the construction and maintenance of track, and the methods by which our standards are being brought up to a much higher level than those which we inherited in 1960. It is impossible to condense a complete p.w. manual into very brief notes, but it is hoped that we have covered the important points. The P.W. Adviser and Chairman will be delighted to expand the information at any time.

General. All relaying is to Permanent Way Institution Standards and to the class used for British Railways Goods Lines. 95 pounds per yard bullhead rail in serviceable condition, standard chairs and sleepers spaced at an average of 2'6" are used. Antiquated components are scrapped or relegated to museum use if unsafe or unserviceable. The Ministry of Transport Inspector said in 1960 that he "had seen mineral lines in worse condition than this". That was 6½ years ago. Our P.W. Adviser points out the important essentials: "Always check gauge, alignment and level."

Maintenance of Existing Track. This should be done as a regular routine. Check the gauge, especially at curves and turnouts. Look for loose or broken chairs. Tighten fishplate bolts and oil them. Replace or knock in keys. Oil slides and moving parts of junctions. Pack ballast under loose sleepers. Clear dirt and vegetation off rails and sleepers. Check that cross level does not vary suddenly. Check alignment of joints and see that adjoining rail ends are in line at the running edge.

COMPONENTS OF PERMANENT WAY.

Wooden Parts. Sleepers 10" by 5". Timbers 12" by 6", the latter used at turnouts, where extra support is needed or at rail joints. Normal length 8'6", up to 14'6" at turnouts. Spacing 2'6", less at joints, turnouts or places where extra strength is needed. Junctions may be of timbers or may have interlaced sleepers over the part between the switches and the common crossing.

Rails. The Running Rails have their Running Edge inside, i.e. the important edge for keeping to gauge. The switches have a fixed Stock Rail, and a Switch Rail, with a toe and a heel end. The Common Crossings have left and right Wing Rails, and the Vee is made of the Point Rail with the nose ¾ inch wide sitting in the A chair, and a Splice Rail bolted to it with 2 Throat Bolts of different sizes. The distance between the nose of the crossing and the outer end of the two rails usually differs by a foot so that sleepers on the adjacent plain track can be interlaced until the 6 feet clearance between adjacent lines is reached. Normal rail lengths used on our line are 60, 45 and 30 feet. Other lengths cut specially to fit between switches and common crossings and between adjacent sections of track are Closure Rails. Check Rails are used opposite common crossings to prevent flanges hitting the nose, and also on curves, being obligatory for sharper than 10 chains radius, or 8 chains in the case of light railways.

Chairs. Standard S1 chairs have 3 holes for screwing down to sleepers with coach-screws. S2 is a lighter type occasionally seen. S1J is a heavier type with longer support for the rails, and used at joints or turnouts where greater strength is needed, they are sometimes known as "Joint Chairs". At Junctions special chairs are needed. At the switch end of the junction, the special chairs have the letter P in their reference code. The ordinary P chair, of which there are usually 4 or more each side, have a flat surface to support the switch rails in both open and closed positions, with boltholes to fix to the Stock Rails, and spacer blocks to keep the switch rail in exactly the correct position.

These P chairs are followed by a sequence of 4 or more double chairs, as the 2 rails diverge but are not far enough apart to use 2 ordinary chairs. They are numbered and in pairs for the left and right hand sidea. Thus a 1PLB is the first special chair on the left hand side for a type B switch, a 4PRC is the 4th on the right hand side of a C type switch. These are keyed to the rails not bolted.
At the timber where the lateral strain is greatest on the chairs, namely just where the switch rail starts, it is usual to put a steel plate (the sole plate) under the chairs to hold the rails to gauge despite the side thrust of switches and trains.
Ll chairs are a 4-hole, square cross section chair for use where rails are close together and Sl chairs could not be fitted.
At the common crossings the most important chair holding the nose of the common crossing point rail, and both Wing Rails is the A chair, followed down the Vee of the crossing by the B,C,D and E chairs depending on the angle of the rails at the crossing. Holding the Wing Rails before the Vee are the X and Y Chairs. All these special chairs are designed to hold rails very securely in place at a critical position.
Check Rails are held by PW chairs, the flangeway distance being $1\frac{3}{4}$ inches, increased to $3\frac{1}{2}$ inches just at the place where the check rail starts, at which place a PWX chair may be used or the end of the Check Rail bent to give a smooth lead in to the flanges. On sharp curves a special check chair giving 2" check flangeway may be used.
The Common Crossings are known by the tangent of the angle of the Vee, so that a 1 in 6 common crossing has a Vee angle of $9^{\circ}28'$. The overall length of a junction naturally depends on the types of switch and common crossing. A switches are the shortest being 20 feet switch rails and 27'6" stock rails. B,C,D, and so forth are longer and with an easier curve. The switch rail on all of them starts 5'5" from the end of the stock rail.

A Complete Turnout. A complete turnout is often measured by the "Lead", which is the distance between the toe of the switch and the nose of the common crossing. The "Fine Point" is the position at which the point rail would end if it tapered to a sharp end instead of a flat end. It may be helpful to illustrate in detail the specific case of the A and 6 turnout which is to go at the bottom loop junction. It has 20 feet switches on 27'6" stock rails, with closure rails of 20'11$\frac{1}{4}$", 22'9$\frac{1}{4}$", 23'0$\frac{1}{4}$" and 20'8$\frac{1}{4}$". Common Crossing is 1 in 6, with overall lengths 19'5$\frac{1}{2}$" and 18'0". 2 11' Check Rails, and outer running rails, 19'5$\frac{1}{2}$" and 18'0", 30 timbers, 8 pairs of fishplates and 272 coach screws.
2 Timbers with SlJ chairs. 5 Timbers with P chairs, the first having a sole-plate, and two having long timbers for the operating lever. 4 timbers with special chairs of the 1 to 4 PLA and PRA types 2 Timbers with Ll or Ll and Sl chairs at the rail-joints between switches and closures. 5 Timbers with 4 Sl chairs carrying plain rails. 5 Timbers carrying PW or PWX check chairs outside, and the Ll, X,A or B crossing chairs centrally. Timber with 2 Sl chairs outside and the C chair inside. One Timber with Sl and Ll chairs, lastly 2 Timbers with 2 Sl chairs for the final rail joints. Overall length 67' 7$\frac{3}{4}$". Lead 50' 11$\frac{3}{4}$".

Miscellaneous. All metal keys normally used. Coach Screws and bolts to be oiled before use. Fishplates 4 hole with spacing of holes 4$\frac{1}{2}$" 5" 4$\frac{1}{2}$". 2 Hole 5" fishplates still useable. Use washers always when fixing bolts. Superelevation on new track Nil as not needed at our speeds. Gauge 4'8$\frac{1}{2}$" but up to $\frac{3}{4}$ inch wider allowed on curves if very shapr. Up to $\frac{1}{4}$ inch tight to gauge maximum permissible. Regular packing of ballast especially under chairs essential especially after relaying.
Tools for standard maintenance: Keying Hammer, Coach Screw and fishplate spanners. Gauge, level, oil can shovel and light hand jack. Principal Middleton Junctions: Loop Bottom A and 6, Top C and 8. Moor End Jcn B and 8 with interlaced sleepers. New turnout for Clayton's Curve C and 9.