

Gwili Report

November 10, 2011

1 Introduction

It has been decided to carry out a case study in proving safety of actual railway. Safety being an abstract property, such that “trains do not derail or collide”.

On Friday 28th October 2011 I visited Gwili Railway, Carmarthen to gather information about the rail yard and to initiate a good dialogue with its members.

The railway currently¹ consists of 3 stations, two of which are in the same block section, I did not visit these as there is no signalling at these stations. The third station “Bronwydd Arms” is the main station, and contains the signalling components (signals, points and interlocking). operates a number of trains, from steam to diesel and has become a tourist attraction, operating regular services for family days out.



¹The line is currently being extended into Carmarthen.

2 History

The line was opened in 1860 and ran from Carmarthen to Conwil. It was initially operated by Carmarthen and Cardigan Railway Company, but was soon taken over by Great Western Railway.

In 1965 the line was decommissioned, and the tracks removed in 1975. By 1978, Gwili Railway had purchased and rescued 8 miles of track.

3 Topology

The layout presented is only that of Bronwydd Arms, it consists of a two sets of points (12,15) under the interlocking control and a number of signals. Each of the two sets of points have track circuits to prevent them being moved while a train is on them.



The rail yard is split into two sections, one section denoted “MAIN” for passenger trains, and the other denoted “LOOP” for manual shunting and should not be used for passenger services. There are two more sets of points in the “LOOP” section, but these are not controlled by the interlocking.

3.1 Signals

There are a wide variety of different signals in use, from main signals for passengers (3,16,4,19), main signals for freight/shunting (6) and a calling-on signal (5). The calling on signal is used for concatenating two trains. Shunting signals (17,7). There are also a number of stop signals² but these do not have identifiers as they can't be controlled by the interlocking.

²Permanently fixed at the stop aspect.



Signal 19



Signal 17

3.1.1 Lamp Proving

Lamp proving is done by multiple methods, the main signals are proven using a system of relays that are energised when a bulb blows, resulting in an audible alarm at the signal box. This is essentially the same as modern railways. In the case of other signals that are visible from the signal box, such as the shunting signal 17, a small window is visible on the back of the unit from the signal box.

3.2 Points

The points are controlled by leavers in the signal box. If a set of points is to be used by passenger service, then it must be proved and locked into position while a passenger service is authorised to use the set of points. In the UK, it is a legal requirement for sets of points to be locked when used passenger services in the facing³ direction. This is because in the early days of railways, a large number of derailments on main lines were caused by the set of points either not fully in position (lump of coal jammed between the point blade and stock rail was a common occurrence.) or moving as the train passed over.

Each set of points is attached to a track circuit relay, when a train is detected on the set of points the leavers controlling that set of points is electrically locked. This is a requirement of Her Majesty's Railway Inspectorate (HMRI) placed upon Gwili.

3.2.1 Facing Points Lock

These are mechanical locks, whereby a metal bar slots into a special cutout on the stretcher bar to prevent them accidentally moving while in use; one cutout for normal and one for reverse. These locks at Gwili had 2mm play, i.e. the point blades could move maximum 2mm when locked. For each set of points to be locked, a lever is provided in the signal box that locks/unlocks the FPL.

³The facing direction is where the line diverges, as opposed to convergence in the other direction (trailing).

The FPL not only locks the set of points, but it also proves that they are in the correct position. If the FPL can not be locked then, the stretcher bar (and in-turn the point blades) are not in position.

In modern points machines, the FPL is replaced by an internal electronic clamp and is not visible on the track.



Facing Point Lock



Point controlling, two for each set of points.



Track Circuit Relay

4 Control Table

Has not been provided yet, each route is guarded exclusively by one signal.

5 Interlocking

The interlocking is electromechanical, the major logic is provided for by the mechanical locking frame⁴. The electrical locks relate to track circuit detection.

⁴See <http://www.signalbox.org/branches/pw/index.htm> for more information about ground frames.



Interlocking Topside



Interlocking Underside



Interlocking Underside 2



Point Lever Lock



Relays