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SPEED CONTROL

by John Jesson

Continued from page 13 June 1991 Swiss Express

Speed boards

Permanent restrictions of speed below that permitted over the stretch of line are indicated by speed boards.



The actual beginning of the restricted section is marked by an **Anfangssignal**, a square white board with three diagonal black stripes.



The end of the restricted section is marked by an **Endsignal**, a square white board with two vertical black stripes.



The speed permitted is shown in black on a white board, positioned the braking distance from the start of the speed restriction. If two speeds are shown, one above the other, the higher speed applies to trains of category R (Usually, these days, all passenger trains), while the lower speed applies to all other trains.

For a period, as an experiment, special round boards were installed between Bern and Lausanne, which applied only to trains formed of Type III Swiss Express stock. The experiment was not extended at the time, but was later revived at various locations between St.Gallen and Geneva for trains formed of stock permitted to traverse curves at a higher speed. The speed and commencement boards have an orange border, with the terminating board has a green border.



Alteration of permitted speed



Where the permitted maximum speed of a section changes, the location of the point of change is indicated by a Kilometer marker. Speeds are not marked, these being shown in the working timetable.

Permitted speed over weighbridges and track brakes



The maximum permitted speed over weighbridges and track brakes (as used in hump marshalling yards) is indicated on a board at the location. It does not apply to shunting moves, where the highest speed does not exceed that shown on the board.

Regulation of of train speed

On heavily used lines, to minimise signal delays, station staff can indicate speed instructions to drivers of non-stop trains by displaying one of three boards.



Schnellfahrttafel

(White upward-pointing chevron on black)

Run at the highest possible permitted speed to the next station, where train must make a timetabled or out-of-course stop, or the instruction will be cancelled by use of one of the other two boards.



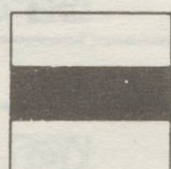
Langsamfahrttafel

(White downward-pointing chevron on black)

(The same board as above, upside down)

Reduce speed to an extent that the journey time to the next station is increased by one third.

If, at the next station, no further board is displayed, then the train, if it had been running early, has resumed its correct time; if running late, then the driver must seek to make up time.



Beibehaltungtafel

(Black horizontal bar on a white board)

Maintain present degree of early or late running to the next station, where the train must make a timetabled or out-of-course stop, or will have this order cancelled by one of the two preceding boards.

Temporary speed restrictions

Portable signs indicate the location of temporary speed restrictions.

Placed the braking distance from the site of the restriction is the warning board (**Vorsignal**), which is orange and carries a black number on an illuminated white background. Two flashing orange lights below the board identify the location at night, and a track magnet is usually installed to give an indication in the cabs of trains. The speed permitted over the restricted section is given by the number displayed $\times 10$, giving a range of possible speeds from 10 km/h to 90 km/h.

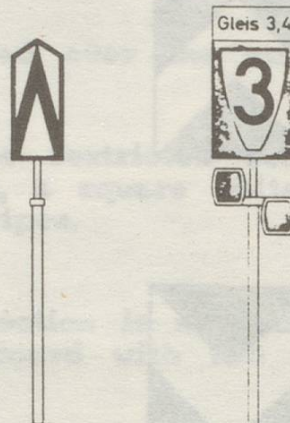
The beginning of the restriction is marked by an orange board with a diagonal white stripe, and a single flashing orange light (**Anfangssignal**), while the end of the restriction is marked by a green board with a white chevron and a single flashing green light (**Endsignal**).



If, between the Vor- and Anfangssignal, there is pointwork allowing a diversion from the track(s) which are affected by the temporary speed restrictions then, following the point on the unaffected route, a cancellation signal (**Aufhebungssignal**) will be placed. As soon as the front of a train has reached this signal, it may proceed at the maximum speed permitted by the working timetable, or by the last Hauptsignal.

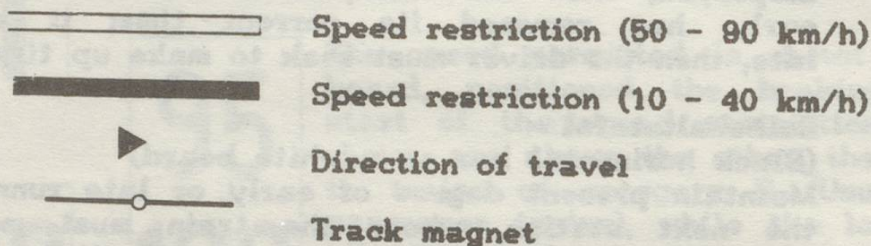
The Vorsignal may carry a white board advising which tracks are affected (such as at a station).

Where there are tracks on both sides of any of the signals, arrows mounted above the boards will indicate to which track the signal applies.



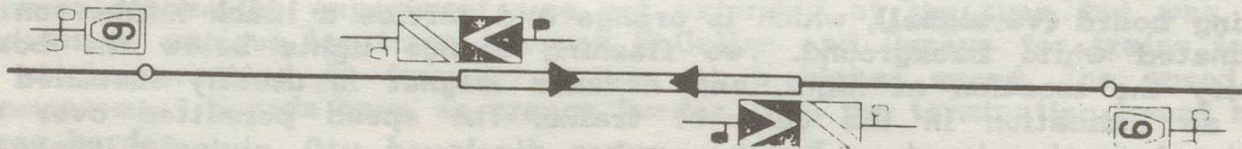
Location of temporary speed restriction boards

Key

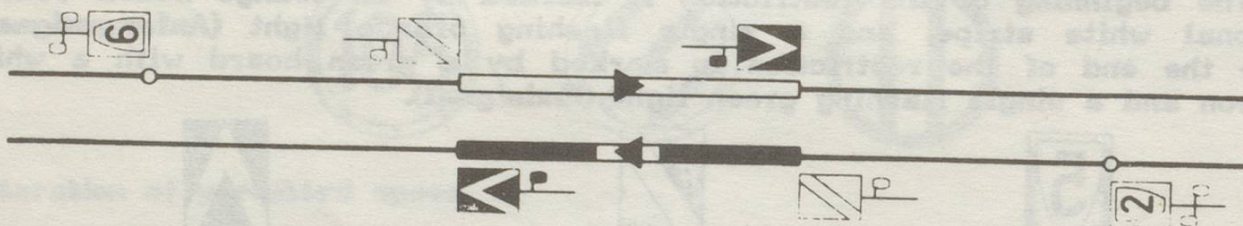


- i) Warning, commencement and cancellation signals are normally positioned to the left of the track. The end signal is placed on the left on double track lines, on the right on single track.

Single track

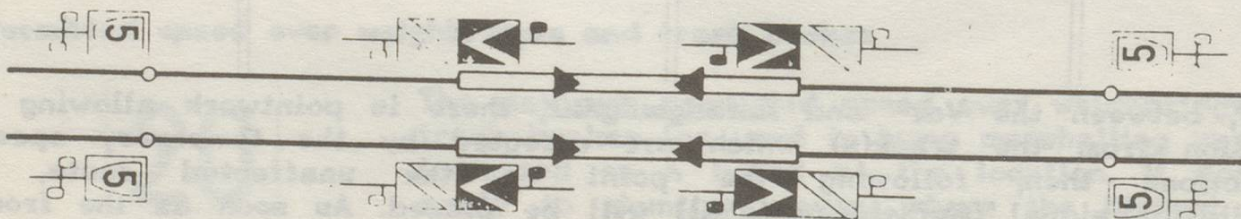


Double track



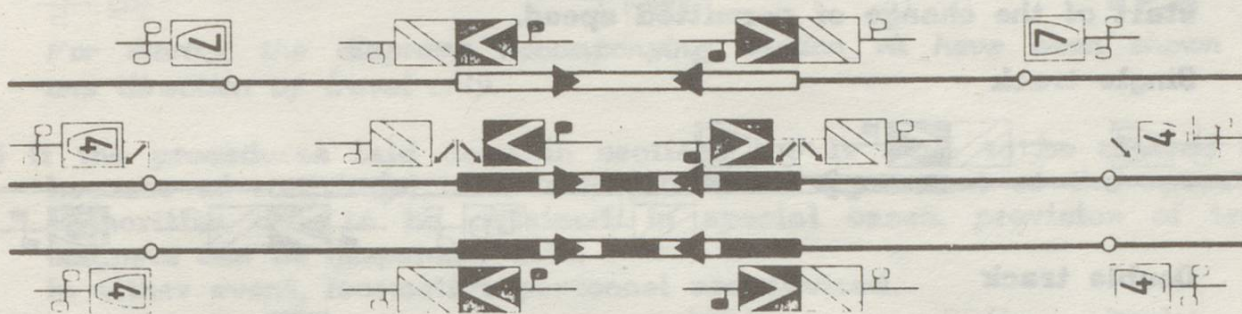
- ii) On two-track sections with reversible working, all signals for both directions are positioned on the outer sides of the formation.

Double track with reversible working

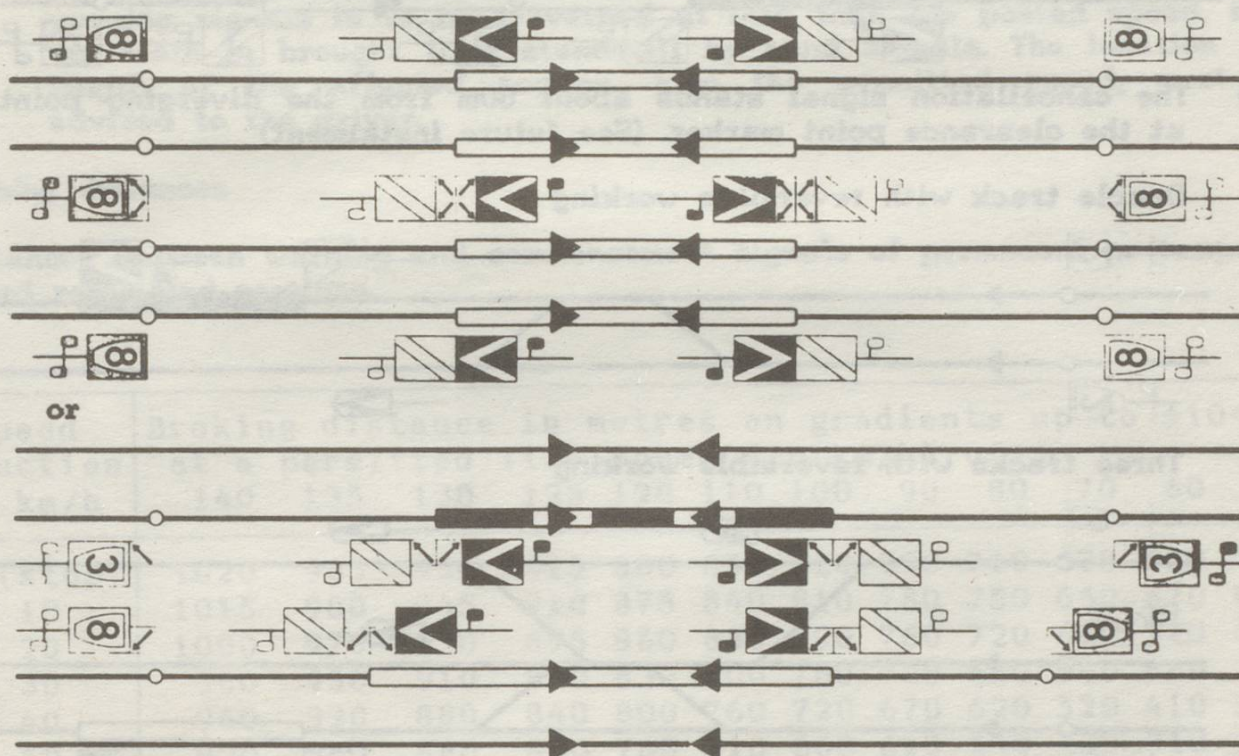


- iii) On more than two-track sections (eg, single next to double tracks, three or more tracks with reversible working), the signals applicable to the outer of the tracks are placed on the outer sided of the formation. The signals for the inner tracks carry arrows indicating the track to which they are applicable.

Three tracks with reversible working



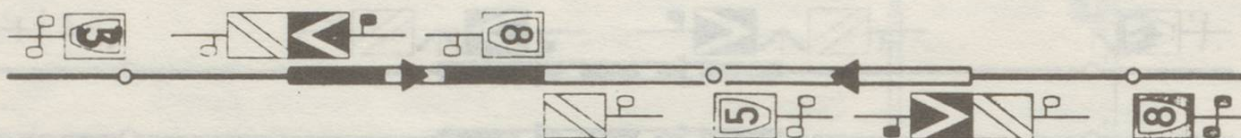
Four tracks with reversible working



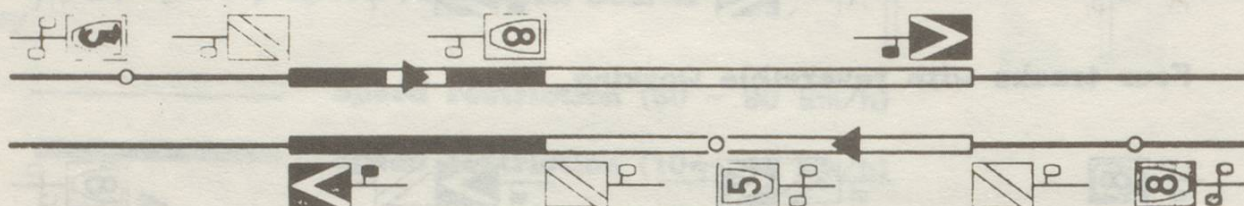
- iv) At stations (between the first and last points) the signals are normally positioned to the left, except:
- alongside the outermost track
 - between platforms
 - at stations on double-track routes where the rules in sections i - iii apply.
- v) If the normal stopping point of a train at a station or halt is after the warning or commencement signal of a restriction, but more than 300m before the commencement or end signal, then a repeating signal is installed. This will either be a second warning signal (without track magnet), if the stopping point is between the warning and commencement signals, or a second commencement signal, if the stopping point lies between the commencement and end signals (ie within the speed restriction).

- vi) If the permitted speed within a restriction changes part way through that restriction, then this is marked by a second warning signal. If the second part of the restriction allows a greater speed then this second warning signal will display only one flashing orange light and will not be accompanied by a track magnet. There will be no second commencement signal and the warning board will be positioned at the start of the change of permitted speed.

Single track

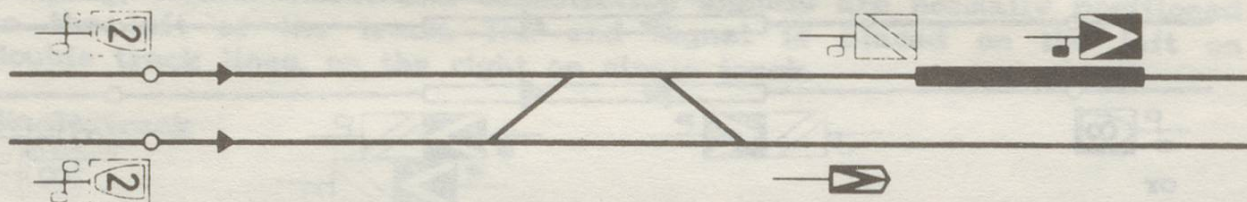


Double track

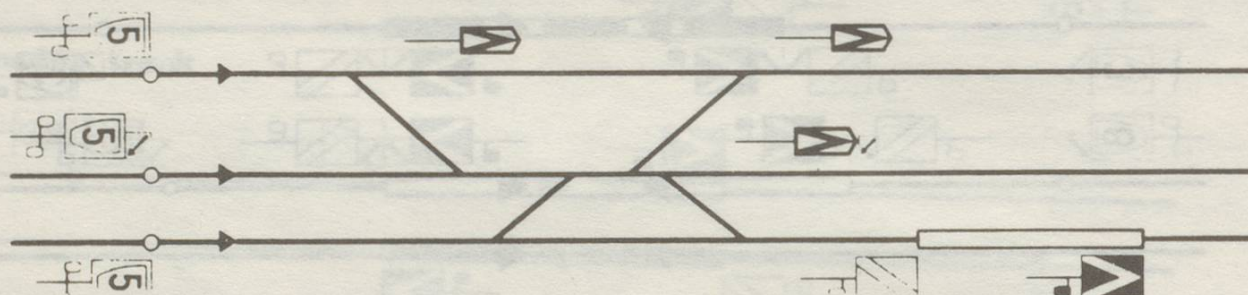


- vii) The cancellation signal stands about 50m from the diverging point, or at the clearance point marker. (See future instalment)

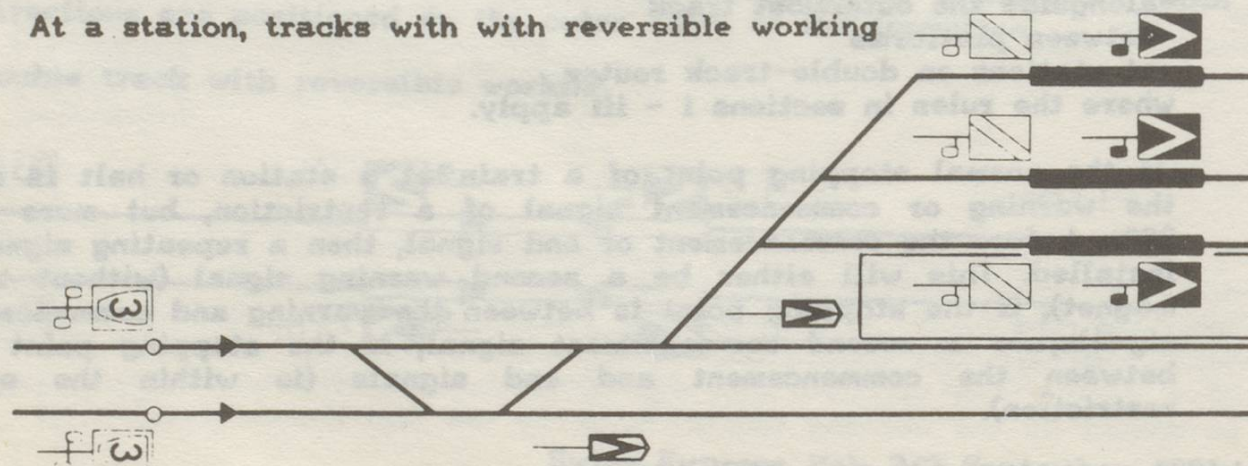
Double track with reversible working



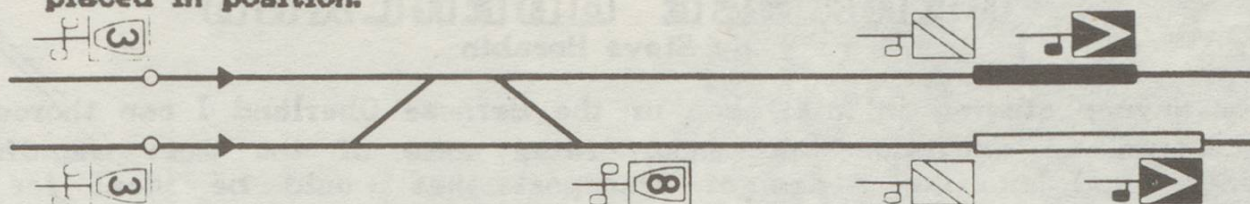
Three tracks with reversible working



At a station, tracks with with reversible working



If the restriction is not wholly lifted, a second full set of signals (warning, commencement and end), with with no track magnet, will be placed in position.



For clarity, the diagrams accompanying section vii have been shown for one direction of travel only.

viii) If the procedures laid down in sections i - iv have to be altered (eg, because of restricted clearances), then the agreement of the operating authorities was to be obtained. In special cases, provision of track magnets can be dispensed with.

In either event, locomotive personnel are advised.

ix) If it is not possible to give drivers written advice at the previous station that the next section of track must be traversed at less than the normal speed, or that a temporary speed restriction equipped with warning signals is to be traversed at less than the posted speed, then the train is brought to a standstill by hand signals. The location and length of the affected section, also the permitted speed, must be advised to the driver.

Braking distances

Distances between warning and commencement signals of permanent or temporary speed restricted sections.

Speed reduction in km/h	Braking distance in metres on gradients up to $\pm 10\%$ at a permitted line speed (in km/h) of:											
	140	135	130	125	120	110	100	90	80	70	60	50
0 (stop)	1020	985	950	915	880	850	820	790	760	670	580	490
10	1015	980	945	910	875	840	810	780	750	660	570	480
20	1000	970	930	895	860	830	790	760	720	630	540	440
30	980	950	910	870	830	800	760	720	680	580	480	380
40	960	920	880	840	800	760	720	670	620	520	410	300
50	920	880	840	800	760	710	660	610	540	430	310	-
60	880	840	800	750	710	650	600	530	450	320	-	-
70	830	790	740	690	640	580	520	430	330	-	-	-
80	770	730	680	630	570	500	420	320	-	-	-	-
90	710	660	610	550	490	410	310	-	-	-	-	-
100	640	580	530	470	400	310	-	-	-	-	-	-
110	560	500	440	370	300	-	-	-	-	-	-	-
120	470	410	340	270	-	-	-	-	-	-	-	-
130	370	310	-	-	-	-	-	-	-	-	-	-
Add on for falling gradients:						Subtract for rising gradients:						
between 11 - 20 ‰ + 50m						between 11 - 20 ‰ - 50m						
between 21 - 30 ‰ + 100m						between 21 - 30 ‰ - 100m						

Next issue - Point lanterns, audible signals