

REVISION EXERCISE (WEEKS 1---11) PART ONE

- Q1). Identify the plan symbols on the sheet provided (Appendix A).
- Q2). Draw the relevant plan symbols to depict the equipment listed below :-
- a). A Fixed Distant signal,
 - b). A Semaphore Stop signal slotted from another signalbox,
 - c). A Banner signal,
 - d). A 3 Lever Ground Frame , Uncovered,
 - e). An AWS inductor on a Unidirectional line which is 180 yards from the signal to which it applies,
 - f). A 4 Aspect colour-light signal which has facilities on a panel for automatic operation,
 - g). A Track circuit Eutectic Strip,
- Q3). If a Ground signal has a yellow arm , what does this mean ?
- Q4). How does a designer know from looking at the signalling scheme plan that he has to provide the signalman with an indication of whether a set of mechanical points were Normal , Reverse or in neither of these positions ?
- Q5). Where do we place a signal replacement joint ahead of a controlled signal ?
- Q6). What are the two types of signal arm operation in use ?
- Q7). Where should signals be positioned in relation to the track ?

- Q8). What do the following signal aspects indicate to a train driver:-
- a). Red,
 - b). Yellow,
 - c). Double Yellow,
 - d). Green.
- Q9). Draw a sketch showing a typical Home , Distant and Starting signal arrangement. Show on the sketch the berth track circuit and the symbols for line clear release , Home Normal Control , Normal Contact on the relevant signals
- Q10). What is the distance between a Distant signal and its associated Home signal known as ?
- Q11). State the factors that have to be considered when calculating the distance in Question 10.
- Q12). At a Semaphore Junction signal how does the train driver know which signal refers to the main route ?
- Q13). At what gradient is it considered essential to provide " Catch points " to prevent an unbraked divided freight train running back into a following train ?
- Q14). What are the three positions indicated on a Standard Block Instrument ?
- Q15). Draw a typical Block section between Drury Junction and Dibden Hall signalboxes showing the relevant semaphore signals for both the Up and Down lines , the Block sections , Station Limits and the Block acceptance overlap point.
- Q16). What must the signaller observe before giving the "Train out of section " bell signal to the signal box in rear ?

Q17). Define the term " overlap ".

Q18). Referring to Appendix B state the conditions of all the signals (Aspects Displayed)

a). With the control signal 101 at Red
and when the following conditions are evident :-

- 1). TC's AF & AC Occupied,
- 2). TC's AF , AG Occupied and Signal 104 showing no light ,
- 3). TC's AE & AC Occupied ,
- 4). Lights out of Signals 101 & 104

b). With the control signal 101 at Yellow
and when the following conditions are evident :-

- 1). AC Occupied and 104 with no lamp ,

c). With the control signal 101 at Double Yellow
and when the following conditions are evident :-

- 1). AC , AE & AF Occupied ,

d). With the control signal 101 at Green
and when the following conditions are evident :-

- 1). AD & AB Occupied and no lamp in 102.

Q19). Name the Pre-Commission S & T Testing activity that was not completed and had disastrous consequences in terms of the Clapham Junction Railway Accident.

Q20). What are the colours of the following levers :-

- a). Gong ,
- b). Spares ,
- c). Ground signal ,
- d). Facing point lock ,
- e). Detonators (Up Main) ,
- f). Electrically operated points ,
- g). Block Released Semaphore Signal ,
- h). Distant signal.

Q21). Using simple tappet interlocking sketches show the following :-

- a). Lever 1 locks 2N ,
- b). Lever 1 released by 2R , 3R ,
- c). Lever 2 locks 3 Bothways ,
- d). Lever 1 locks 3N with 2R.

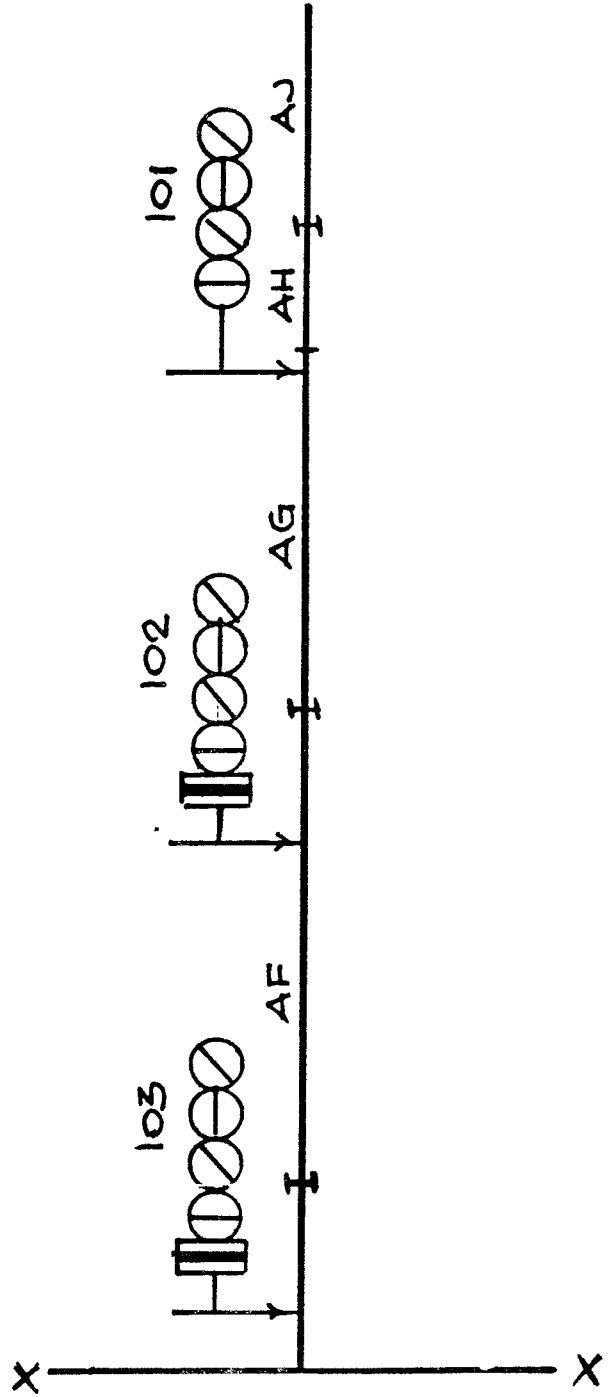
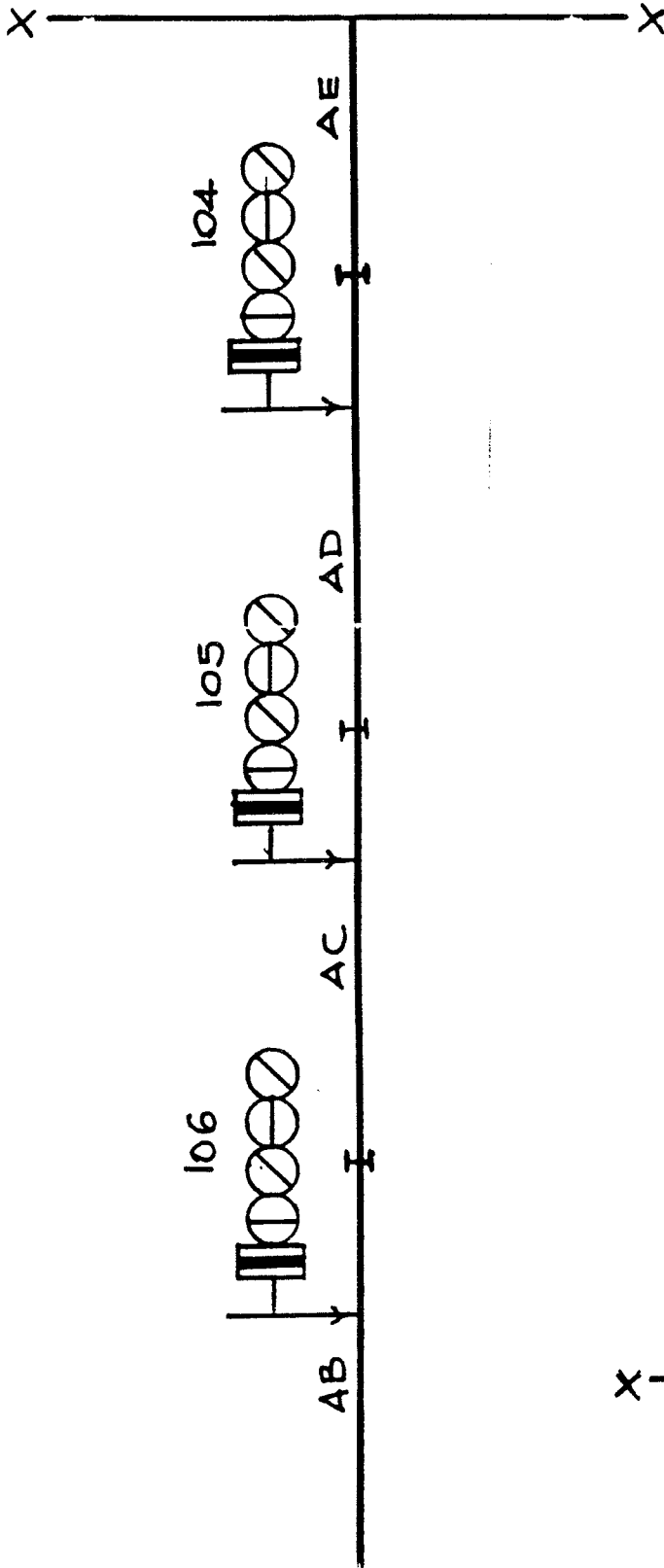
Q22). Why do some levers have short handles ?

Q23). What is the purpose of mechanical sequential locking ?

Q24). With reference to mechanical interlocking when long bars are in compression what is needed to avoid distortion ?

Q25). Provide the interlocking figures for the layout shown (Appendix C).

APPENDIX B



Q12). On a line equipped with AWS , how far in rear of the signal is the AWS normally placed and in what order are the electro and permanent magnets installed on the track ?

Q13). What "audible indications" are recieved in the drivers cab when approaching signals displaying the following conditions in AWS territory :-

- a). Semaphore distant signal in the clear position ,
- b). Colour-light signal showing a "Double Yellow" aspect ,
- c). Colour-light signal showing a "Green" aspect ,
- d). Semaphore distant signal in the caution position ,
- e). Colour-light signal showing a "Red" aspect ,
- f). 3 aspect (R/Y/G) signal with the light extinguished.

Q14). Draw a basic DC Track circuit.

Q15). Why do we need single rail track circuits ?

Q16). What is the minimum effective length of a track circuit ?

Q17). On AC Electrified lines it is a requirement that the traction return rail is situated on which side of the line ?

Q18). Fill in the missing words ommited from the following sentences :-

- a). The Civil Engineer when designing the 1:100 or 1:200 scale plans always draws the railway lines as an $\frac{1}{100}$ measurement.
- b). When the Signal Engineer states a 6'-0" (1.83m) fouling point this measurement is an $\frac{1}{100}$ measurement.

- Q19). Define the meaning of the term "neutral" when referring to relays.
- Q20). For a line circuit in 25kv Overhead traction area , what type of relays would have to be used ?
- Q21). What is the maximum number of contacts that can be used on a BR 930 Spec series relay ?
- Q22). Identify the wiring symbols on the sheet provided (Appendix B).
- Q23). The main filaments of which lamps must be indicated back to the signalbox/relay room for a 4 aspect signal ?
- Q24). What type of lamp is used in a colour-light signal head ?
- Q25). What is the voltage from the location to the signal head before it is transformed down to 12 volts ?
- Q26). If a lamp which is lit is taken out of a 3 aspect colour-light signal , what effect does this have on the signal in rear ?
- Q27). Place the following cable conductors in order of ascending resistance value:-
- a). 70mm^2 , 16mm^2 , 35mm^2 (aluminium cables) ,
 - b). $50/0.25\text{mm}$, $7/1.35\text{mm}$, $9/0.30\text{mm}$,
 $16/0.30\text{mm}$, $7/0.67\text{mm}$ (copper cables).
- Q28). What do the following abbreviations stand for in connection with level crossings :-
- a). MCB ,
 - b). ABCL ,
 - c). MWL ,
 - d). AOCL ,
 - e). AHB.

Q29). Name 6 methods of Single Line Working.

Q30). Answer these questions regarding the "Tyers Key Token" instrument :-

- a). Can either signalman withdraw a token when the instruments are "Out of Phase" ?
- b). Can the signalmen communicate with the instrument bells when the instruments are "Out of Phase" ?
- c). How many positions are there on the instruments commutator ?

Q31). Draw the signal identification plates used on the following signals :-

- a). I.B Home signal ,
- b). Automatic signal ,
- c). Semi-Automatic signal.

Q32). On passenger lines fitted with M.A.S what is the normal length of an overlap ?

REVISION EXERCISE (WEEKS 1---11)
PART THREE

Q1). What do the following abbreviations stand for :-

- a). IECC ,
- b). RETB ,
- c). SSI ,
- d). PLGS ,
- e). TOL ,
- f). D OF S & T.E ,
- g). MLRI.

Q2). Shown on Appendix A is a typical 3 Aspect Signal Sequence. Train "A" is positioned for you. A following train "B" is following at MINIMUM Headway distance.

On the sketch (APPENDIX A) indicate the following :-

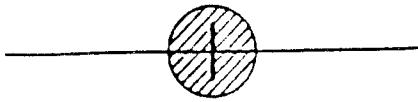
- a). The position of Train "B" ,
- b). The overall headway distance ,
- c). The component parts that make up the headway formula ,
- d). State the headway formula to give the headway in terms of time.

Q3). Calculate the average gradient shown on Appendix B.

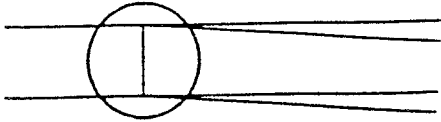
Q4). Indicate on Appendix C where you consider all the Track Circuit Clearance Points to be.

Q5). Using the information provided on Appendices D , E , F & G indicate our departments requirements on the Civil Engineers 1:200 Scale Plan which is located on the bottom of Appendix G.

APPENDIX D



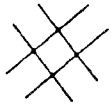
Indicates insulated joint required.



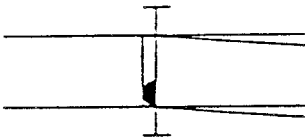
Indicates switch rail, stock rail, soleplate to be pre-drilled for hydraulic clamp locks with multiple drive and soleplates to be insulated in accordance with BRB Drg No BRS-SM 500.

(RCE Drawing RE/PW/55E & RE/PW/277 refers)

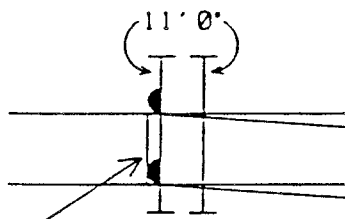
If concrete sleepers are used drill in accordance with BRS-SM 622



Indicates drilling of soleplate for mechanical FPL required to MD 82017



Insulated soleplate required (side of insulation to be shown)



Extended timbers/soleplates for fixing of combined type machine, not clamp locks [add (1) or (2)]

(1) Soleplates to be pre-drilled to BRS-SM 318

OR

(2) Soleplates to be pre-drilled to BRS-SM 319 (right hand drive) or BRS-SM 320 (left hand drive). For single/double slips.

TOE OF POINTS

APPENDIX E

Imperial Rule Using Units of 1 Inch as Reference

SCALES 1 inch to:-	USE ONE OF THE FOLLOWING FIGURES AS YOUR CONSTANT REF.		
	(feet)	(yards)	(metres)
1:50	4.167	1.389	1.270
1:100	8.333	2.778	2.540
1:200	16.667	5.555	5.080
=1 1:480	40.000	13.333	12.192
1:500	41.667	13.889	12.700
=2 1:792	66.000	22.000	20.117
1:1000	83.333	27.778	25.400
1:1250	104.167	34.722	31.750
=3 1:1584	132.000	44.000	40.233
1:2500	208.333	69.444	63.500
1:5000	416.666	138.888	127.000

=1 1" to 40'

=2 1" to 66' or 1 chain

=3 1" to 132' or 2 chains

APPENDIX F

Metric Rule Using Units of 1 Centimetre as Reference

SCALES 1 cm to:-	USE ONE OF THE FOLLOWING FIGURES AS YOUR CONSTANT REF.			
	(feet)	(yards)	(metres)	
1:50	1.640	0.547	0.500	
1:100	3.281	1.094	1.000	
1:200	6.562	2.187	2.000	
#1 1:480	15.748	5.249	4.800	
	1:500	16.404	5.468	5.000
#2 1:792	25.984	8.661	7.920	
	1:1000	32.808	10.936	10.000
#3 1:1250	41.010	13.670	12.500	
	1:1584	51.968	17.323	15.840
	1:2500	82.021	27.340	25.000
	1:5000	164.042	54.680	50.000

#1 1" to 40'

#2 1" to 66' or 1 chain

#3 1" to 132' or 2 chains

REVISION EXERCISE (WEEKS 1---11)

PART FOUR

Q1). Design the bonding required on Appendix A.

Q2). Referring to the diagram below and given the following information calculate the voltage at the extremities of the feeders and whether each voltage is acceptable or not :-

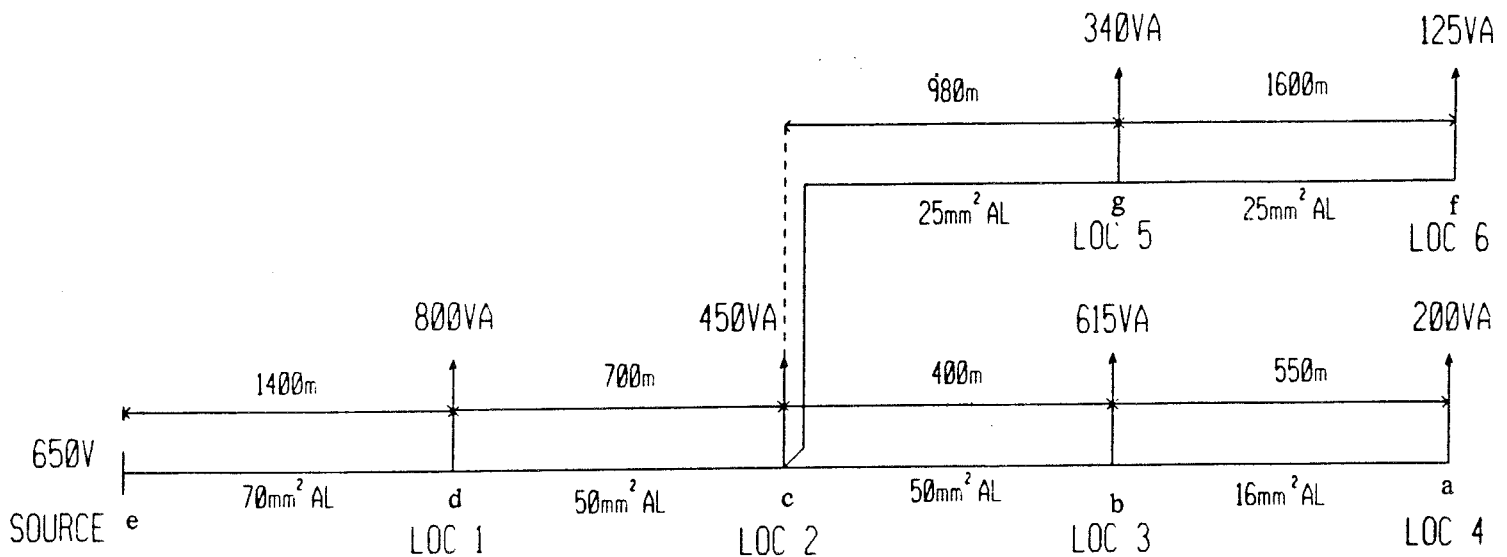
- a). Please note that all loads include 10% excess ,
- b). Resistance Values of Cables :-

$$16\text{mm}^2 = 1.89\text{ohms per Km ,}$$

$$25\text{mm}^2 = 1.20\text{ohms per Km ,}$$

$$50\text{mm}^2 = 0.641\text{ohms per Km ,}$$

$$70\text{mm}^2 = 0.443\text{ohms per Km ,}$$



Q3). Identify and indicate the missing feed voltages , relay coils and relay contacts on Appendix B.

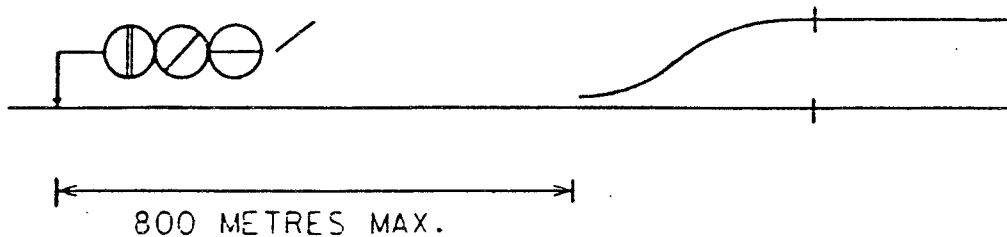
Q4). Below is an extract of Standard Signalling Principle N^o. 57 ,
can you explain the purpose of this principle ?

STANDARD SIGNALLING PRINCIPLE No. 57

Dec 1989

SIGNALS LEADING OVER FACING POINTS

1. A signal which reads over facing points must be positioned not more than 880 yards (800 metres) from those facing points. This does not apply to facing points operated from a ground or shunting frame.



MODULE 10 QUESTION

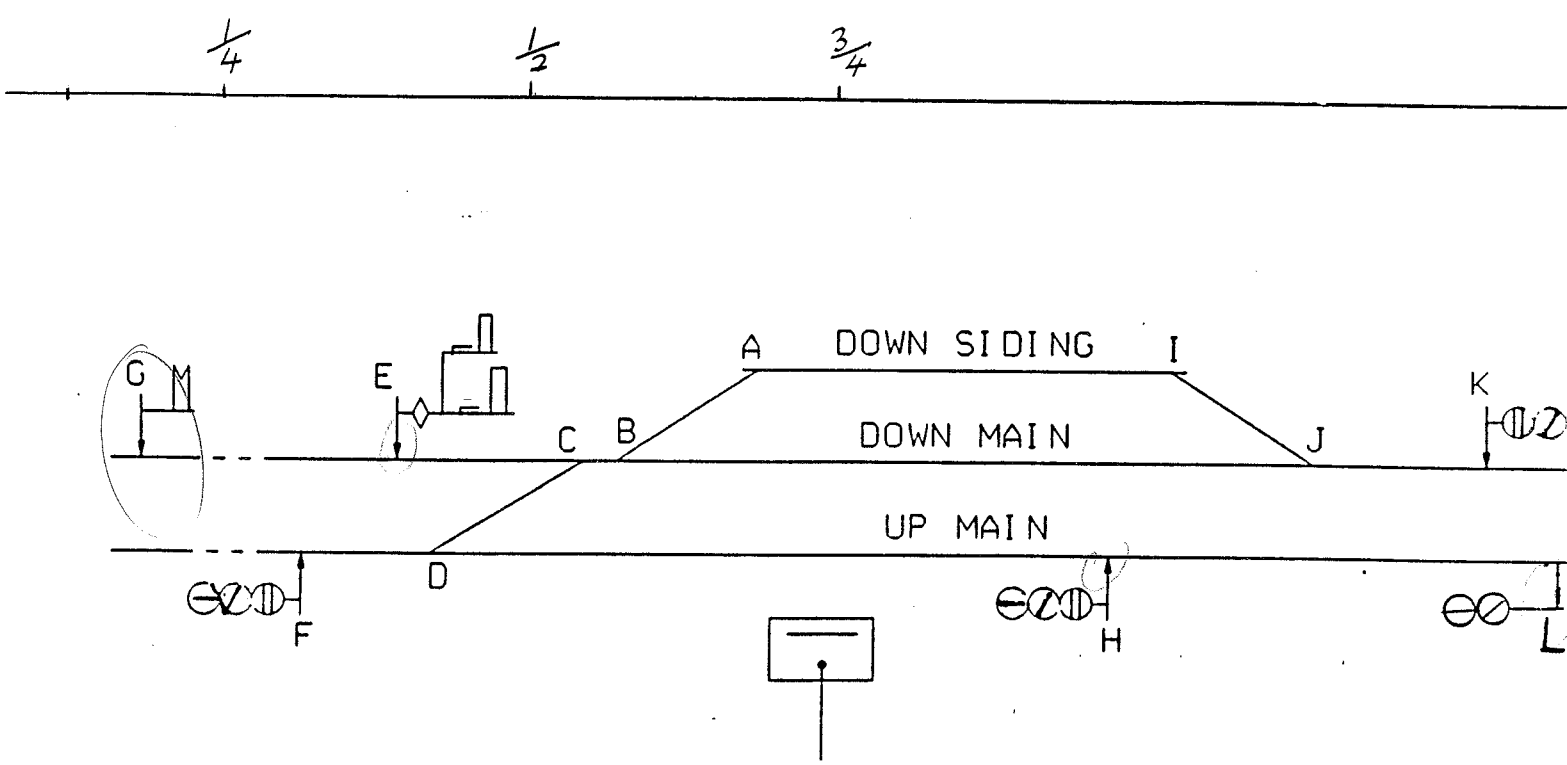
SERVICE BRAKING DISTANCE (SBD)

Using the signalling plan illustrated information provided calculate the required service braking distance (SBD) of the Down Main Distant signal "G" and of the Up Main Distant signal "L".

The maximum speed of the line is 70 MPH.

Graph = Appendix B

The gradient throughout the area is 1 in 300 rising, from left to right.



1:10000

G - 1250

L - 1425