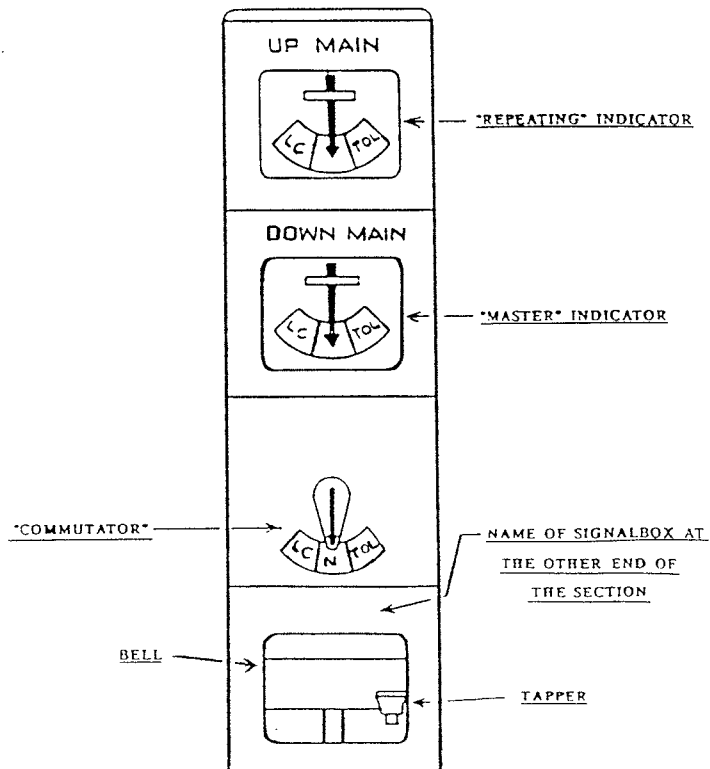
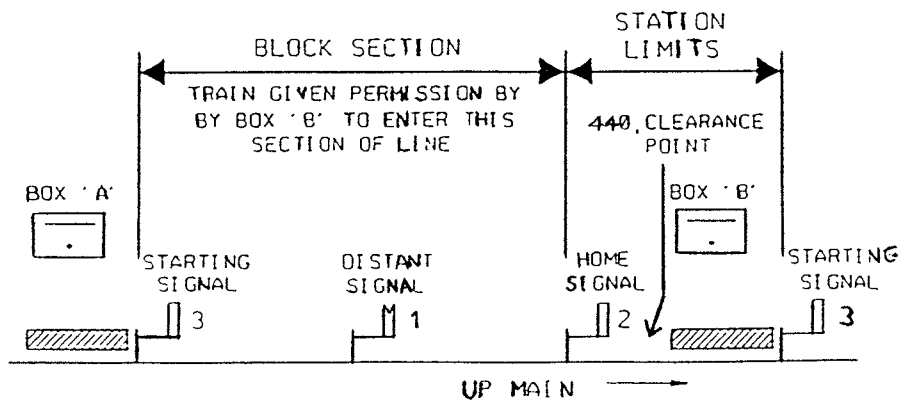


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THE ABSOLUTE BLOCK SYSTEM



THE ABSOLUTE BLOCK SYSTEM

We now come to the day-to-day business of signalling trains on an ordinary section of railway line, in other words how the absolute block system works in practice.

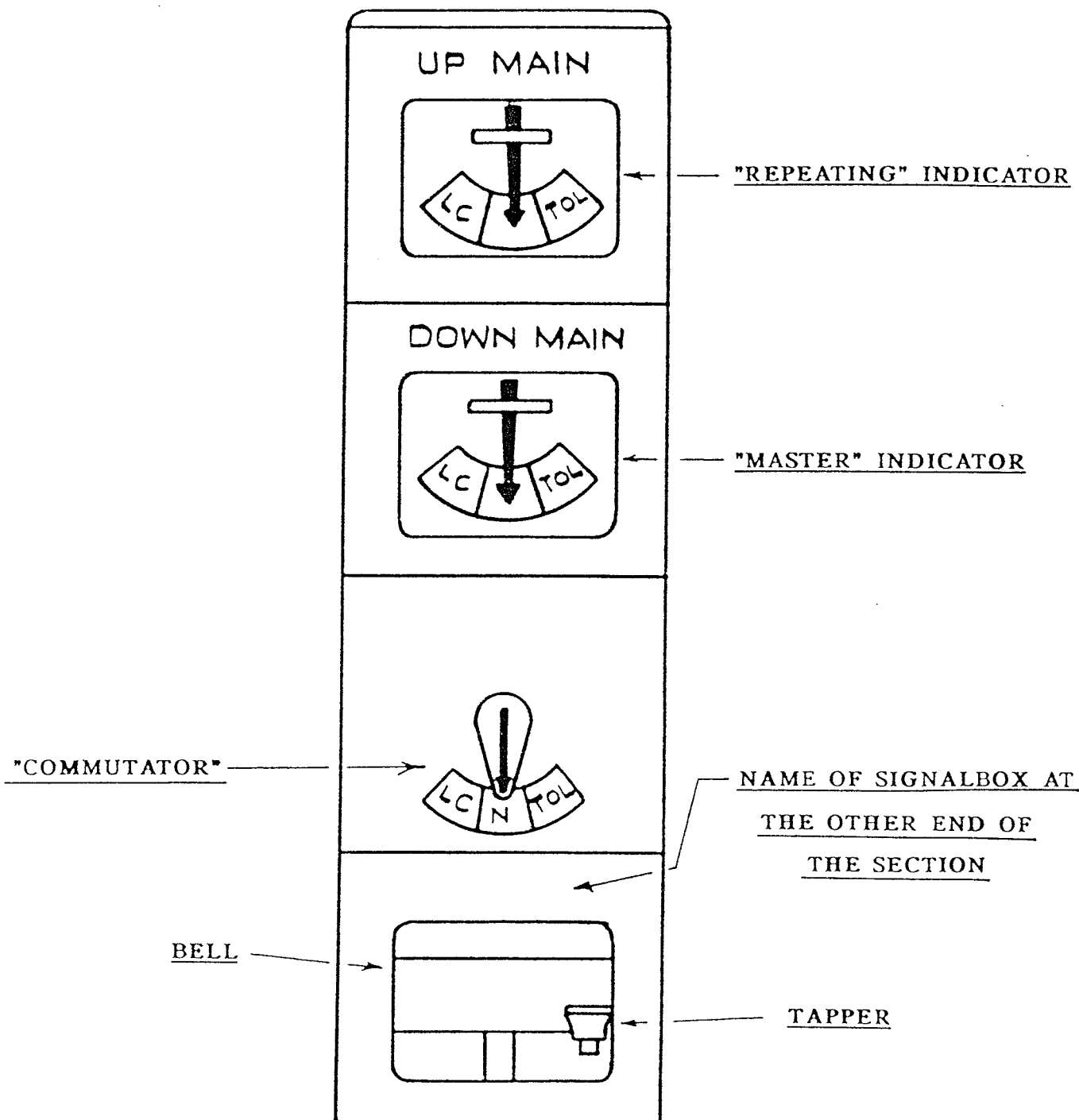
The route is divided into sections known as "BLOCK SECTIONS", each of which is controlled by a signalbox through the medium of "fixed" signals - so called to distinguish them from hand signals given by a man with a flag or lamp.

The length of the block section varies according to the amount of traffic. It may be very short, so that the distant signal of one box is on the same post as the starting signal, or even home signal of the one before it, or it may stretch for many miles where traffic is light and there are no junctions or important sidings etc.

At this point we should mention the block apparatus that the signalman uses to communicate under the block system consists of a single stroke bell and a special telegraph instrument. The signalman uses the bells and block instruments to communicate with each other.

THE ABSOLUTE BLOCK SYSTEM

These instruments may be of several types but for our purposes we will assume they are a Standard BR Instruments.



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The BR Block Instrument is a "combined" instrument; this means that the following are combined in one piece of equipment:-

1. The TAPPER, which sounds the bell in the signalbox at the other end of the section.
2. The BELL, which is sounded in this signalbox by the tapper in the signalbox at the other end of the section.
3. The THREE POSITION COMMUTATOR, which is for the Down line section.
4. The THREE POSITION "MASTER" indicator (the lower indicator) - this is moved by turning the commutator.
5. The THREE POSITION "REPEATING" indicator which repeats the indications of the "MASTER" indicator of the instrument in the signalbox at the other end of the section. The "REPEATING" indicator is the upper indicator and relates to the Up line section.

THE ABSOLUTE BLOCK SYSTEM

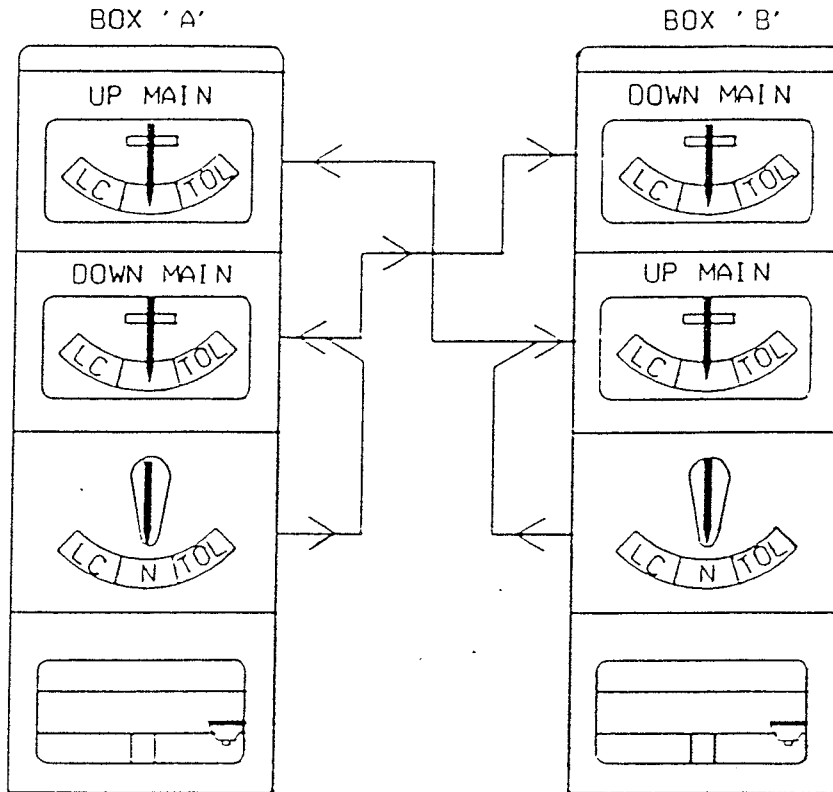
A Block Telegraph Instrument consists of a three position commutator (special type of handle resembling a knob) which is connected electrically to a three position needle type indicator located adjacent to it in the same signalbox, also to an exactly similar indicator at the other end of the section. The three positions of the commutator and of the indicators are

“NORMAL”, “LINE CLEAR” and “TRAIN ON LINE”.

We will call the indicator adjacent to the commutator the “MASTER” indicator and the one in the signalbox at the other end of the section the “REPEATING” indicator because it repeats the indication of the “MASTER” indicator in the other signalbox. The commutator is moved from one position to another by a turning movement. Each movement of the commutator from one position to another position causes both the “MASTER” indicator in one signalbox and the “REPEATING” indicator at the next signalbox to move correspondingly.

THE ABSOLUTE BLOCK SYSTEM

BLOCK INSTRUMENTS IN NORMAL POSITION



After being turned from one position to another position, the commutator remains in that position until the next movement, as does its two indicators.*

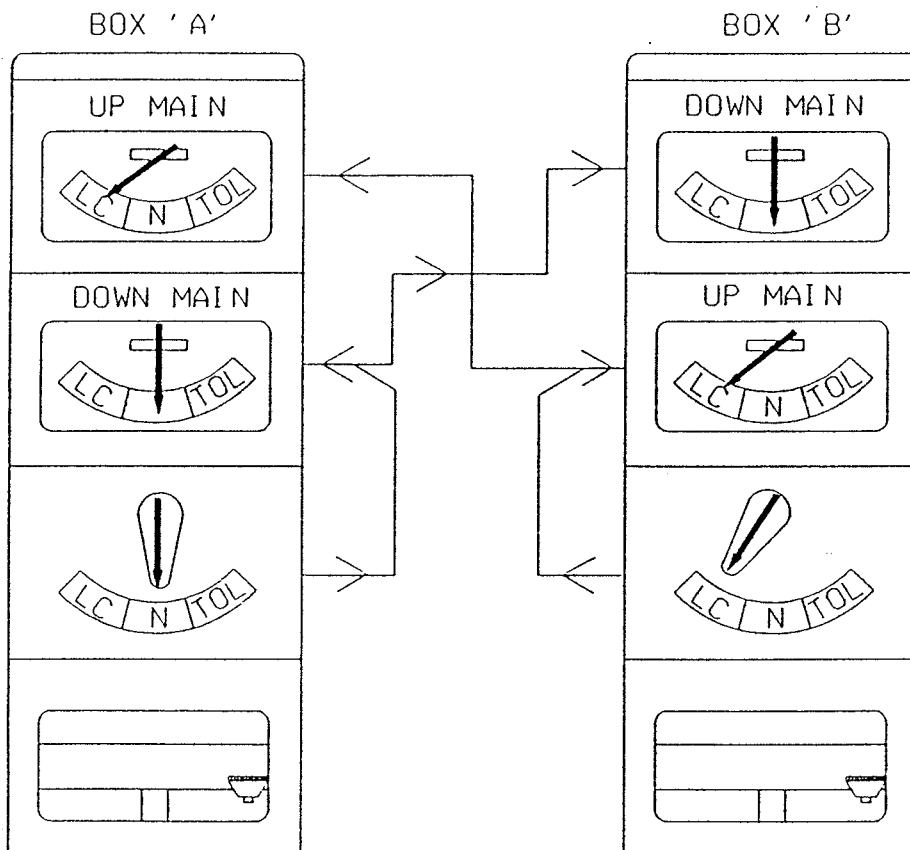
Thus, when the signalman at "B" turns his commutator from one position to another, in this case "LINE CLEAR" on the Up Main, both the "MASTER" indicator in signalbox "B" and the "REPEATING" indicator in signalbox "A" move simultaneously to the corresponding position and remain in that position until the commutator is turned to another position.

The signalman at signalbox "A" cannot alter the position of the "REPEATING" indicator in his signalbox.

* This statement only applies where "STANDARD BLOCK CONTROLS" are applied to Class 3 lines. For further information see E.I S/H/027.

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BLOCK INSTRUMENTS IN THE LINE CLEAR POSITION ON THE UP MAIN



NOTE:- All the Standard BR Instruments you have seen so far indicate that the signalman always turns his commutator to the left when he is giving a Line Clear. This is not always the case, as you will see old G.W.R and L.N.W railway company signalboxes with Standard BR Instruments in which the signalman turns his commutator to the right when giving a Line Clear.

THE ABSOLUTE BLOCK SYSTEM

Let us now take a look at Figure 1, this shows two lines, an Up Main and Down Main. This stretch of line is controlled by three signalboxes "A", "B" and "C".

At this stage we have included no signals. The signalman at "B" controls the block indicators for the Up line from "A" and the Down line from "C". In essence the lines on which trains come towards him. The indicators for the Down line to "A" and the Up line to "C" are controlled by the signalman at "A" and "C" boxes respectively, as these are the lines on which trains approach them.

When there are no trains in any of the sections, all the indicators will show "NORMAL"

According to the principles of the ABSOLUTE BLOCK SYSTEM no more than one train is allowed, in normal circumstances, to be in any block section at one time.

It is most **IMPORTANT** to remember that sections of the Up and Down lines are **Separate Block Sections**.

THE ABSOLUTE BLOCK SYSTEM

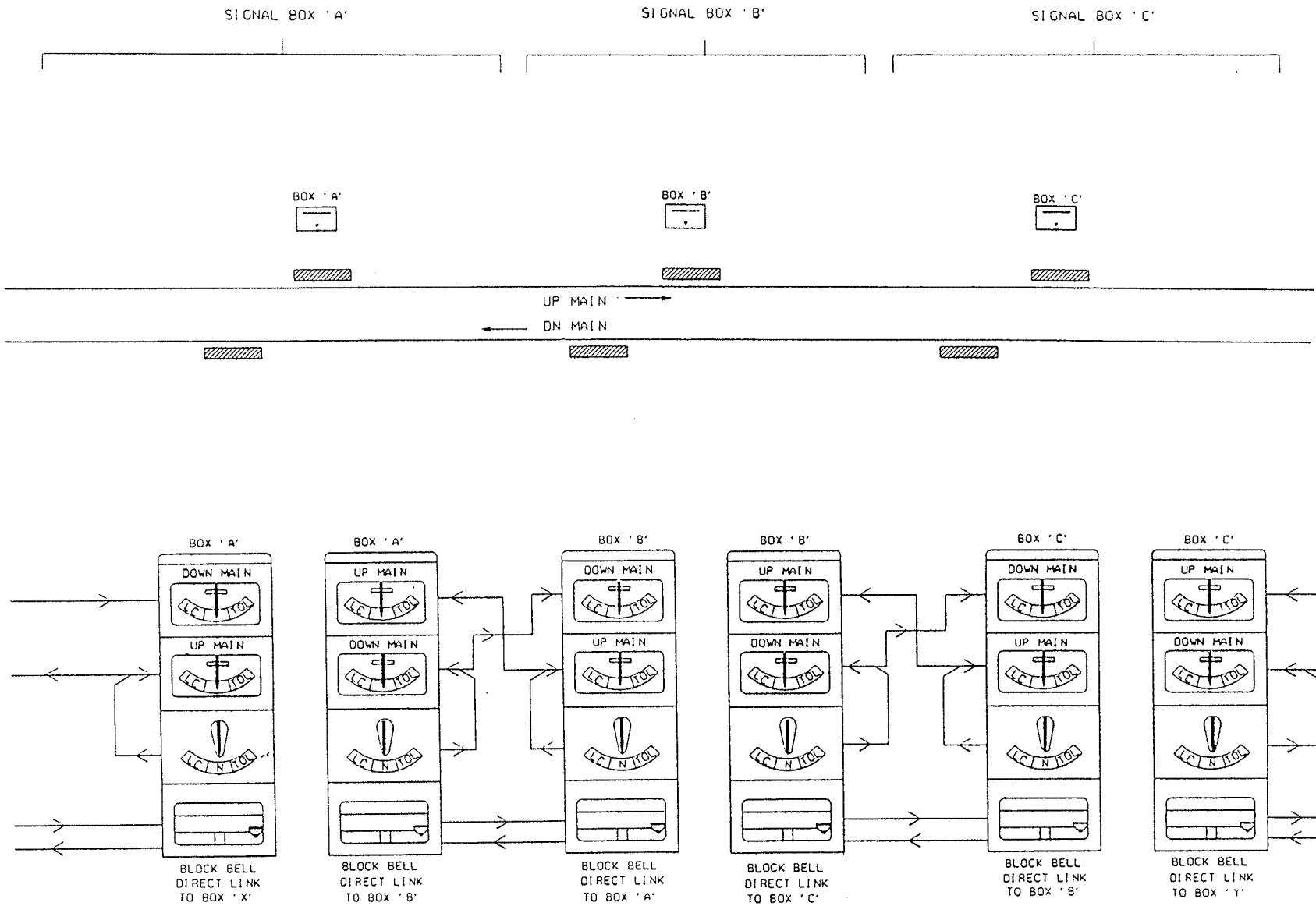


FIGURE 1.

continued

THE ABSOLUTE BLOCK SYSTEM

SIGNALS ASSOCIATED WITH THE BLOCK SYSTEM

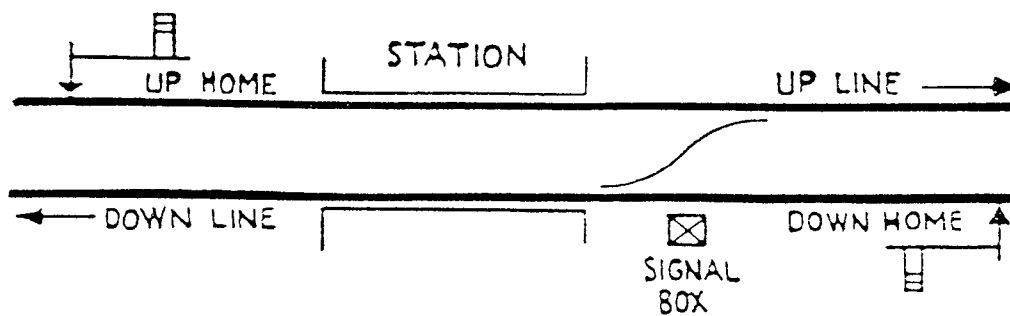
Now let us take a look at the signals associated with the Block System:-

1. Home Signal

Home signals are provided to protect stations and junctions, and when no starting signal is provided, to act as signals controlling movements into a section of line.

They are usually located within 100 yards or so of a station, or converging junction or fouling point. We make a practice of locating home signals overlap distance (440 yards) from the station, junction or fouling point they protect, thus providing adequate distance for the train to be brought to a standstill if the signal is sighted at danger at close range.

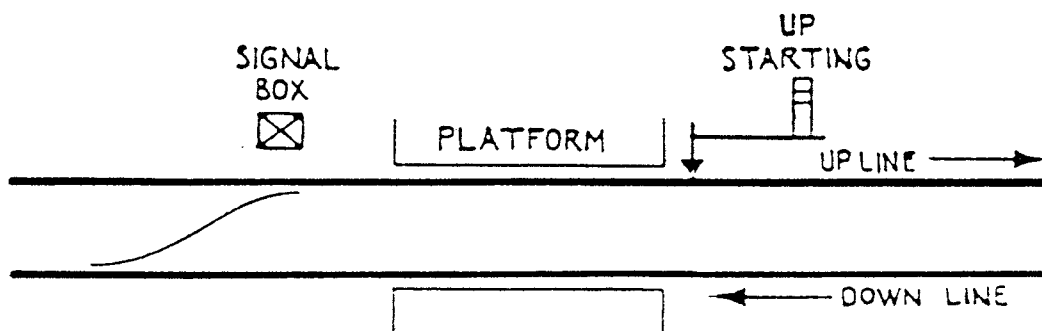
The overlap affords a margin between the signal and a possible obstruction, and provides space in which a train may be brought to rest if a driver has failed to stop the train at the signal.



THE ABSOLUTE BLOCK SYSTEM

2. Starting Signal

When a signalbox is located at or near a station a starting signal is provided to authorise movements from the station. The starting signal authorises movements to the home signal of the next signal box ahead.

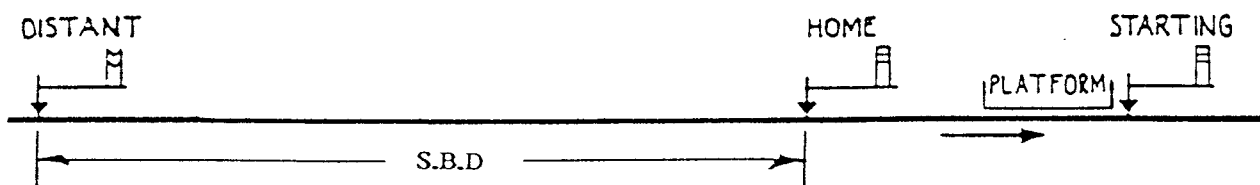


THE ABSOLUTE BLOCK SYSTEM

3. Distant Signal

Distant signals are provided in rear of the home signal to which they apply, and give to drivers a warning of the condition of the home and starting signals controlled from the same signal box. Distant signals may be passed at caution, which aspect instructs a driver to be prepared to stop his train at the home signal. The interlocking at the signalbox is so arranged that the distant signal can only be "pulled off" if the home and starting signals are already "pulled off".

The driver is then given an indication that the line is clear for his train as far as the home signal of the next signalbox.

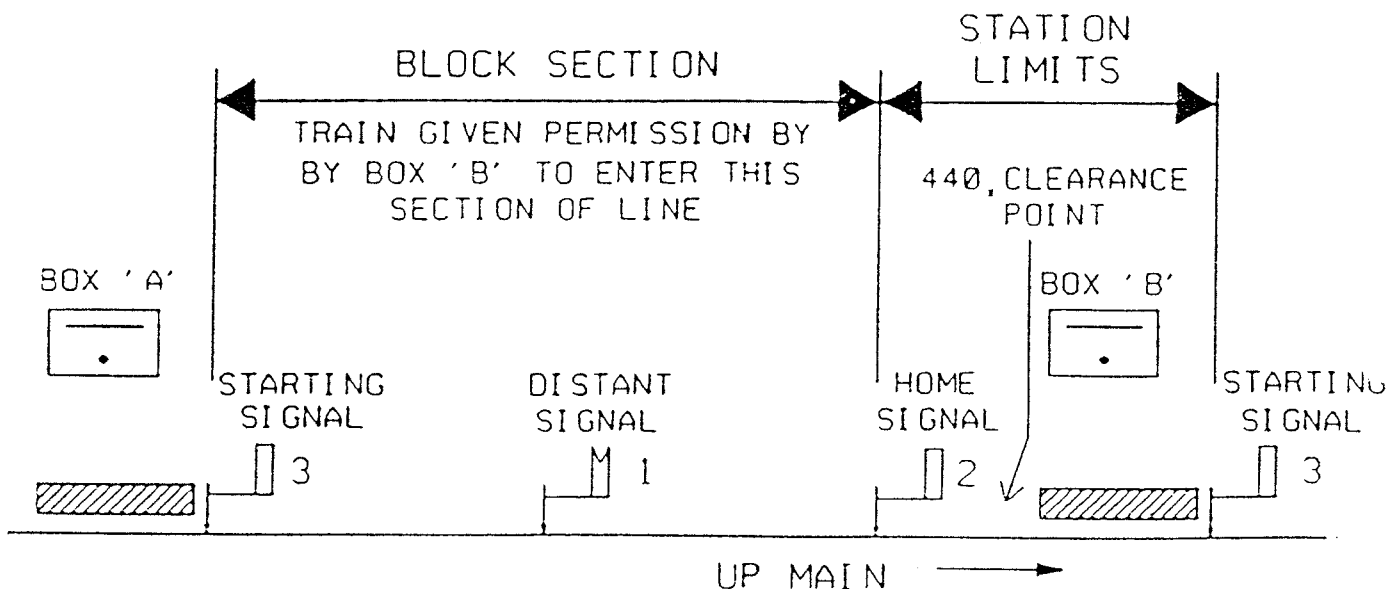


The distant signal is located in such a position that a train approaching it at maximum line speed can be brought to rest at the home signal if it is at stop. The distance varies with gradient, speed of line etc.

THE ABSOLUTE BLOCK SYSTEM

Now let us place the three signals we have so far looked at, the HOME, STARTER and DISTANT signals to the simple layout shown below. You will see that:-

1. The “**BLOCK SECTION**” is from the starting signal of box “A” to the home signal of box “B”.
2. The area between “B”s home signal and his starter is referred to as the “**STATION LIMITS**”. When working under the absolute block system the signalman is allowed to have a train standing in his “**STATION LIMITS**” and still accept another train from box “A”. It enables a greater flexibility when regulating trains.
3. The 440 yards “**CLEARANCE POINT**”. The signalman uses this point to observe that his safety margin is clear of a train and so he is able to:-
 - a). Tell box “A” train out of section and
 - b). Accept another train.



From the information so far discussed let us now take a look at Figure 2. As with Figure 1 we have a stretch of line with 3 signalboxes A, B and C except we have labelled the Up Main showing all the appropriate signals, sections etc. We will now take a look at how the signalmen operate the Absolute Block System by following the sequence of operation as a train progress' from signalbox “A” to signalbox “B”.

THE ABSOLUTE BLOCK SYSTEM

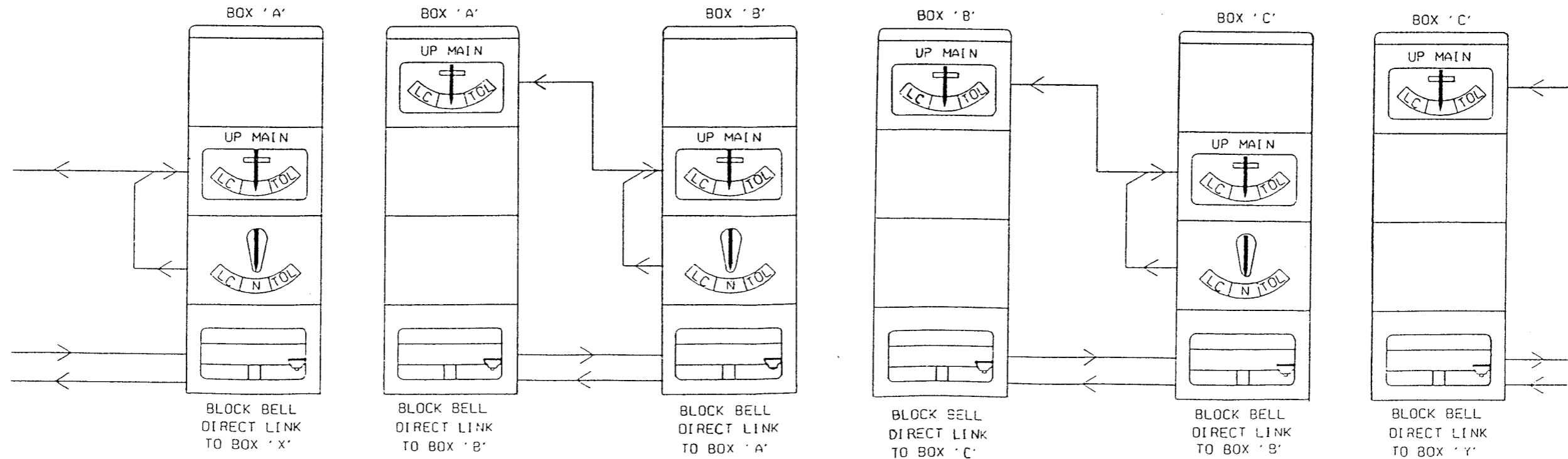
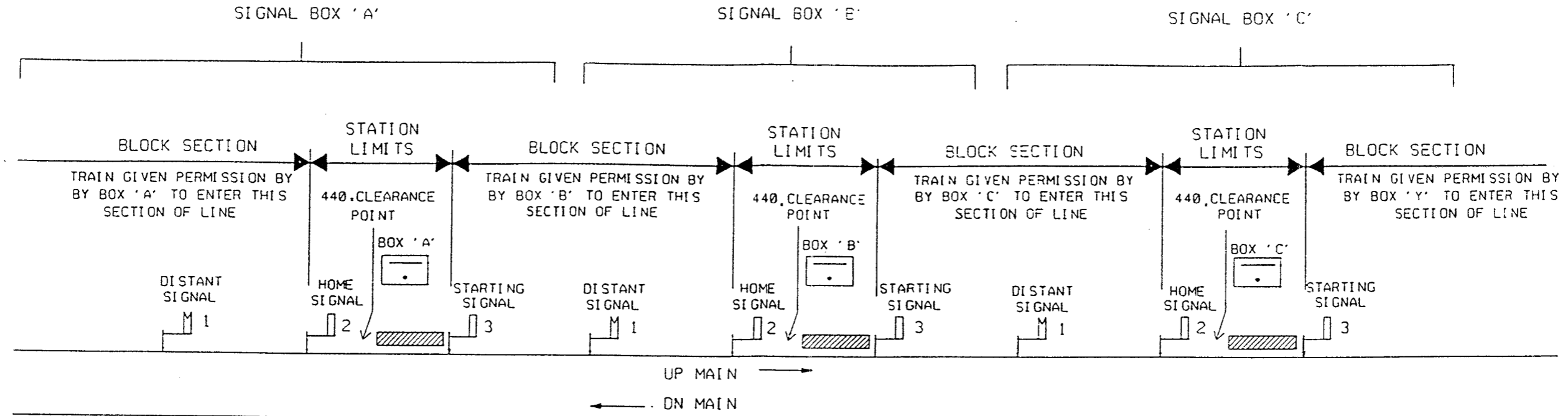


FIGURE 2.

continued

THE ABSOLUTE BLOCK SYSTEM

Attached is an extract of the Standard Code of Bell Signals which is taken from the "Signalmen's General Instructions", Section 4.1. A copy of which is held in the Project Office.

Signalmen's General Instructions

4 BELL SIGNALS

4.1 Standard code of bell signals

These bell signals must be used, where applicable, in accordance with the undermentioned Train Signalling Regulations:—

Absolute Block system (AB) Electric Token Block system
Track Circuit Block system (TC) (ET)

Regulation	Class of Train/Description	Code
—	Call attention	1
AB 3 } TC 3 } ET 3 }	Is line clear for (or Description of train in Track Circuit Block system):—	
	The Royal Train	4-4-4
	Class 1 train	4
	Class 2 train	3-1
	Class 3 train	1-3-1
	Freightliner train	3-2-5
	Other class 4 trains	3-1-1
	Class 5 train	2-2-1
	Class 6 train	5
	Class 7 train	4-1
	Class 8 train	3-2
	Class 9(a) train	1-2-2
	Class 9(b) train	1-4
	Class 0 locomotive(s)	2-3
	Train required to stop in section	2-2-3

SEQUENCE OF OPERATION - BLOCK SYSTEM - UP MAIN

A train is to be passed from "A" to "B", and provided the block indicator is in the normal condition, the signalman at "A" calls attention of the signalman at "B" by giving one beat on the bell.

THE ABSOLUTE BLOCK SYSTEM

This is to make sure that the man at "B" is ready to receive the next bell signal, and to show that he is listening he repeats the single beat back to the man at "A".

The signalman at "A" then sends the appropriate series of rings for class of train on the bell to Box "B", the number and arrangement of rings depending on the type of train. The ring means "**IS THE LINE CLEAR FOR TRAIN?**". If the signalman at "B" can accept the train, he repeats the bell signal back to Box "A", and turns his block commutator for the Up Main from its position at "**NORMAL**" to "**LINE CLEAR**". This shows the signalman at "A" that permission has been granted for the train to proceed.

Once the signalman at Box "A" has obtained a "**LINE CLEAR**" he can pull off his starting signal, this indicates to the driver that he may pass through the section.

As the train passes his "A" signalbox, the signalman at "A" sends two beats on the Bell to Box "B", which means, as can be seen from the bell codes, "**TRAIN ENTERING SECTION**". "B" acknowledges "A"s "**TRAIN ENTERING SECTION**" bell code by repeating 2 beats on the bell back to "A". The signalman at "B", on receiving this signal, places his commutator of the block instrument to "**TRAIN-ON-LINE**".

Both signalmen now have before them a visual indication that the block section is actually occupied.

The signalman at "B", before he accepted the train had to make sure that the indicator was in its normal position and that the line was clear for at least a quarter of mile beyond his home signal number 2, this being the next signal at which the train could be stopped after passing "A"s starting signal number 3.

The distance of a quarter of a mile (440 yards) is the minimum space which the standard block regulations consider should be kept between the tail of one train and the locomotive of

THE ABSOLUTE BLOCK SYSTEM

the one following it (except in exceptional circumstances).

Once the signalman at "B" has made sure that all the proper conditions are fulfilled, and has accepted the train from "A" he must not change the position of any points or do anything which might endanger the train.

If for any reason he is unable to accept the train, the signalman at "B" does not reply to the bell signal from "A", and the box at "A" then repeats the bell signal at short intervals until "B" does accept the train.

The train begins to proceed from "A" to "B". Meanwhile the signalman now decides he must get ready to pass the train onto the next box on the line, Box "C". He follows exactly the same procedure as mentioned above except; this time Box "B" is offering the train.

Our train has now passed Box "B" and the signalman has to observe the train's tail-lamp, and replace the "**HOME**" signal to danger. This shows him that the train is complete and he can then "**CALL ATTENTION**" and send the "**TRAIN OUT OF SECTION**" bell code (2-1) to the Box at "A", who acknowledges this bell signal. He also returns his block commutator to the "**NORMAL**" position.

This completes the procedure between "A" and "B". This procedure continues onto Box "C", "D", "E" etc.

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SEQUENCE OF OPERATION - BLOCK SYSTEM - DN MAIN

Now look at Figure 3, once again we have the same stretch of line only this time we have labelled the Down Main showing all the appropriate signals, section etc.

A train is to be passed from "C" to "B" on the Down Main, and provided the block indicator is in the normal condition, the signalman at "C" calls attention of the signalman at "B" by giving one beat on the bell. This is to make sure that the man at "B" is ready to receive the next bell signal, and to show that he is listening he repeats the single beat back to the man at "C". The signalman at "C" then sends the appropriate series of rings for class of train on the bell to Box "B", the number and arrangement of rings depending on the type of train. The ring means "**IS THE LINE CLEAR FOR TRAIN?**".

If the signalman at "B" can accept the train, he repeats the bell signal back to Box "C", and turns his block commutator for the Down Main from its position at "**NORMAL**" to "**LINE CLEAR**".

This shows the signalman at "C" that permission has been granted for the train to proceed.

Once the signalman at Box "C" has obtained a "**LINE CLEAR**" he can pull off his starting signal, this indicates to the driver that he may pass through the section.

As the train passes his "C" signalbox, the signalman at "C" sends two beats on the bell to Box "B", which means, as can be seen from the bell codes, "**TRAIN ENTERING SECTION**". The signalman at "B", on receiving this signal, places his commutator of the block instrument to "**TRAIN-ON-LINE**".

Both signalmen now have before them a visual indication that the block section is actually occupied.

THE ABSOLUTE BLOCK SYSTEM

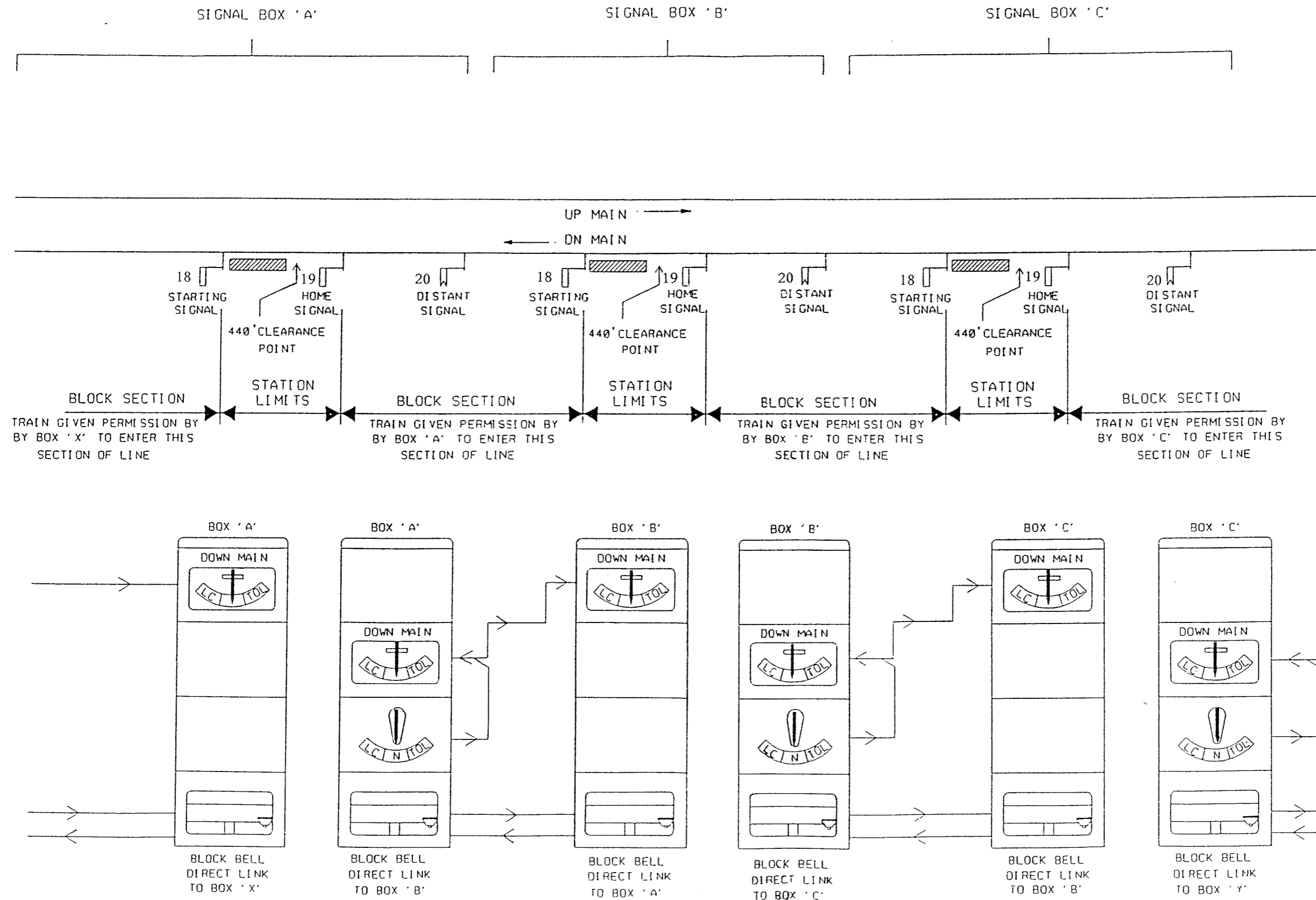


FIGURE 3.

continued

THE ABSOLUTE BLOCK SYSTEM

The signalman at "B", before he accepted the train had to make sure that the indicator was in its normal position and that the line was clear for at least a quarter of mile beyond his home signal number 19, this being the next signal at which the train could be stopped after passing "C"'s starting signal number 18.

Once the signalman at "B" has made sure that all the proper conditions are fulfilled, and has accepted the train from "C" he must not change the position of any points or do anything which might endanger the train.

If for any reason he is unable to accept the train, the signalman at "B" does not reply to the bell signal from "C", and the box at "C" then repeats the bell signal at short intervals until "B" does accept the train.

The train begins to proceed from "C" to "B". Meanwhile the signalman now decides he must get ready to pass the train onto the next box on the line, Box "A". He follows exactly the same procedure as mentioned above except this time Box "B" is offering the train.

Our train has now passed Box "B" and the signalman has to observe the train's tail-lamp, and replace the "**HOME**" signal to danger. This shows him that the train is complete and he can then "**CALL ATTENTION**" and send the "**TRAIN OUT OF SECTION**" bell code (2-1) to the Box at "C", who acknowledges this bell signal. He also returns his block commutator to the "**NORMAL**" position.

This completes the procedure between "C" and "B". This procedure continues onto Box "A" etc.

Finally Figure 4 shows a more realistic layout showing both lines, Up Main, Down Main completely labelled showing all the appropriate signals, sections etc.

Take note of how the "BLOCK SECTIONS" are treated differently on each line.

THE ABSOLUTE BLOCK SYSTEM

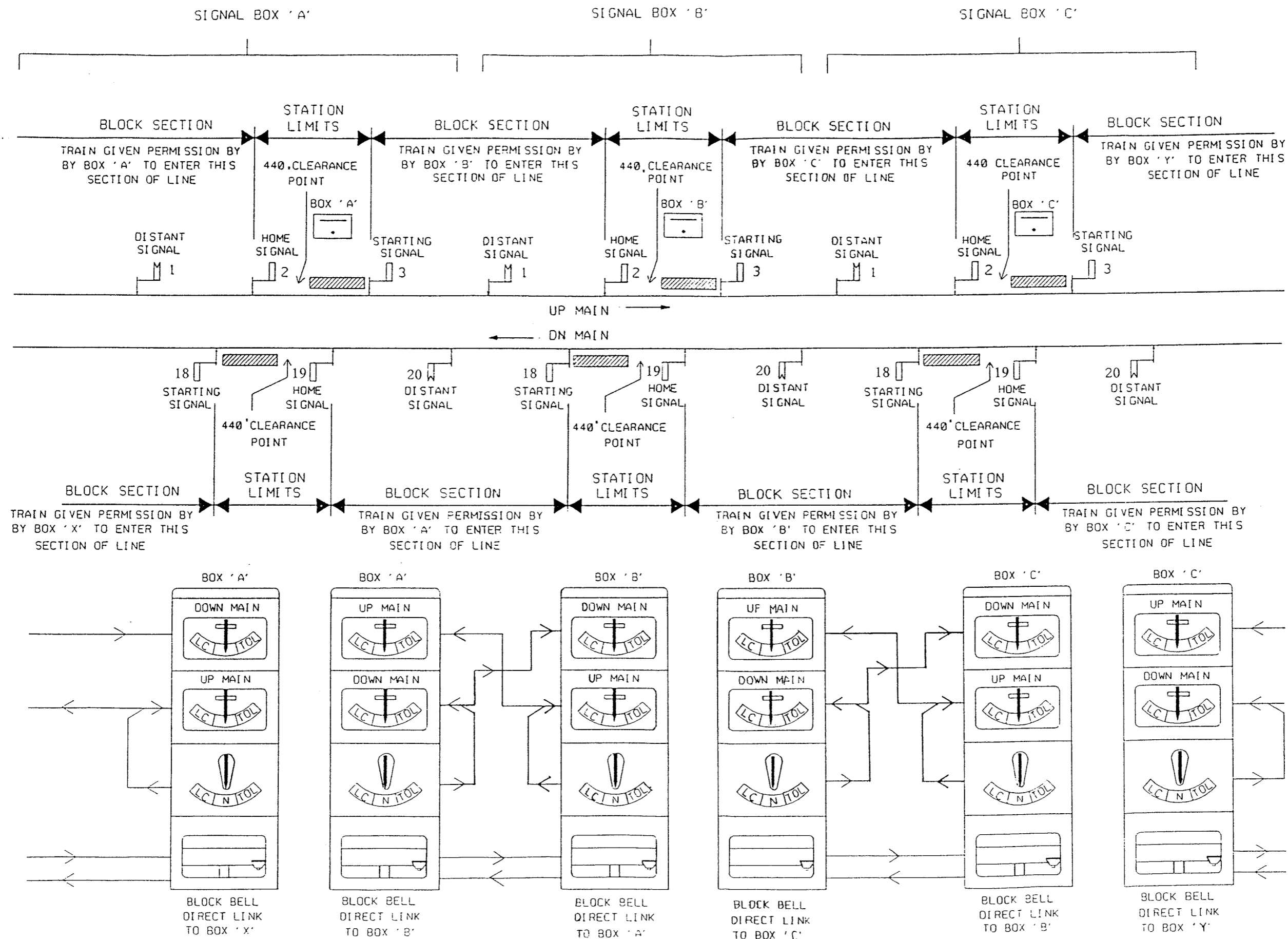


FIGURE 4.