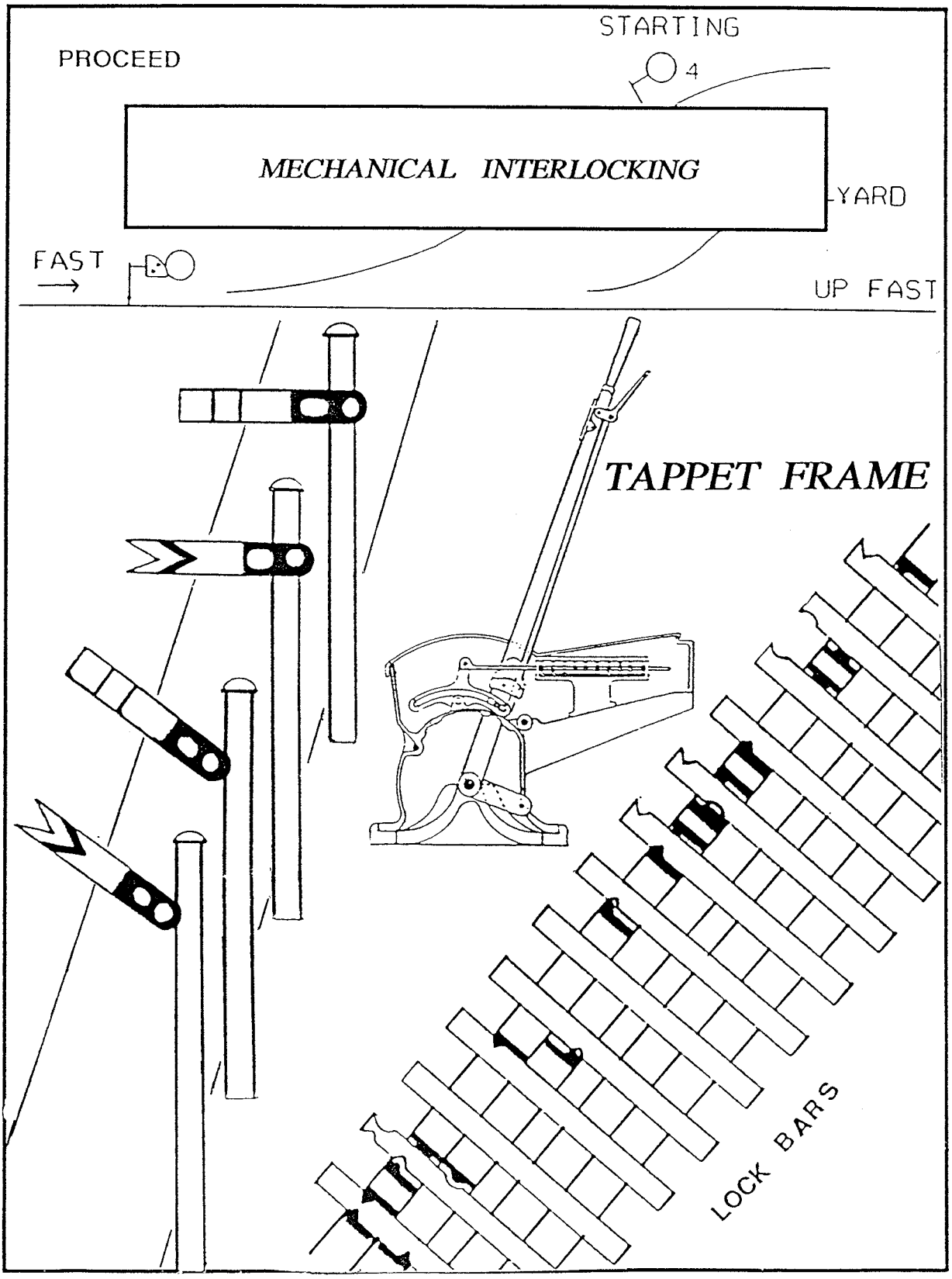
DIRECTOR OF S & T ENGINEERING.
WEST MIDLANDS PROJECTS GROUP.



LOCKING FIGURES

INTRODUCTION

All signals, points and facing point locks in every signalbox, both mechanical and electric, are interlocked to prevent a signalman setting up two conflicting routes at the same time and to ensure that signals can be cleared only when the points to which they apply are correctly set, thus removing as far as possible the risk of collision or derailment.

The interlocking must prevent all possible combinations of lever movements which will set up conflicting routes, but must at the same time permit non-conflicting parallel movements to be made. The document which lays down what the interlocking requirements are is the:-

"Railway construction and operation requirements for passenger lines and recommendations for goods lines (Department of Transport Requirements)"

Attached is an extract from the document mentioned above:-

Signal boxes, interlocking, and controls

23. **General**

The levers working signals and points to be brought close together in a signalbox, or on a properly constructed stage; signalbox names to be prominently displayed. The situation and design of the box, and the arrangement of the lever frame, to be such as to allow the signalman to have the best possible view of the line and of all operations for which he is responsible, with easy access to the windows where necessary.

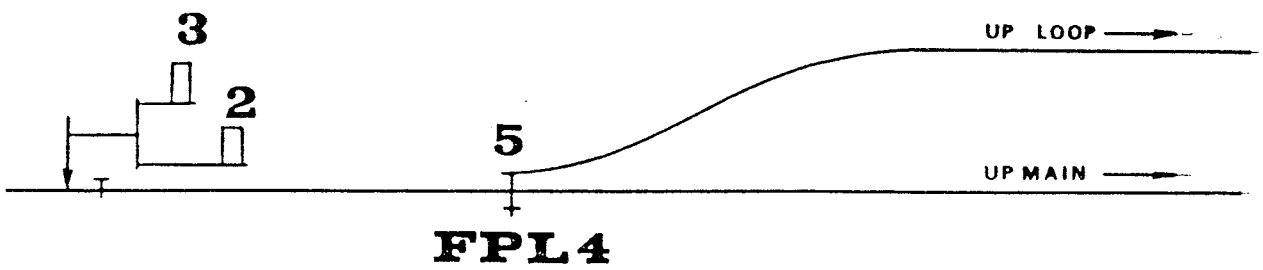
continued

A barrier may be necessary at the foot of the steps. Lavatory accommodation at important boxes where only one signalman is on duty to be within earshot of block bells and telephones if possible.

25. Interlocking

Point and signal levers to be so interlocked that the signalman cannot clear a signal for the movement of a train unless he has set the points in the proper position for it to pass, and bolted them as necessary.

Figure 1. Facing Junction Connection

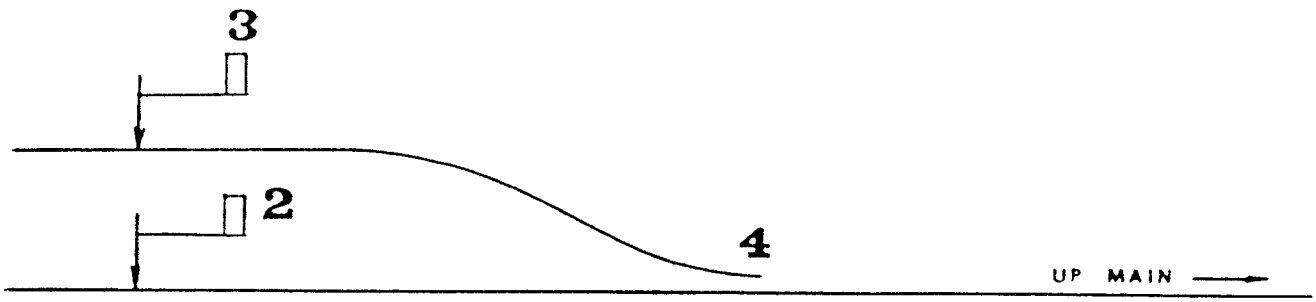


LEVER NO	RELEASED BY	LOCKS NORMAL	LOCKS BOTHWAYS	RELEASES
1				
2	4	5		
3	4.5			
4			5	2.3
5		2		3

continued

"that it shall not be possible for him to clear at one and the same time any two signals, which may lead to a collision between two trains; and that after having cleared the signals to allow a train to pass, he shall not be able to move any points connected with or leading to the line on which the train is moving, until the signals have been replaced."

Figure 2. Converging Junction Connection

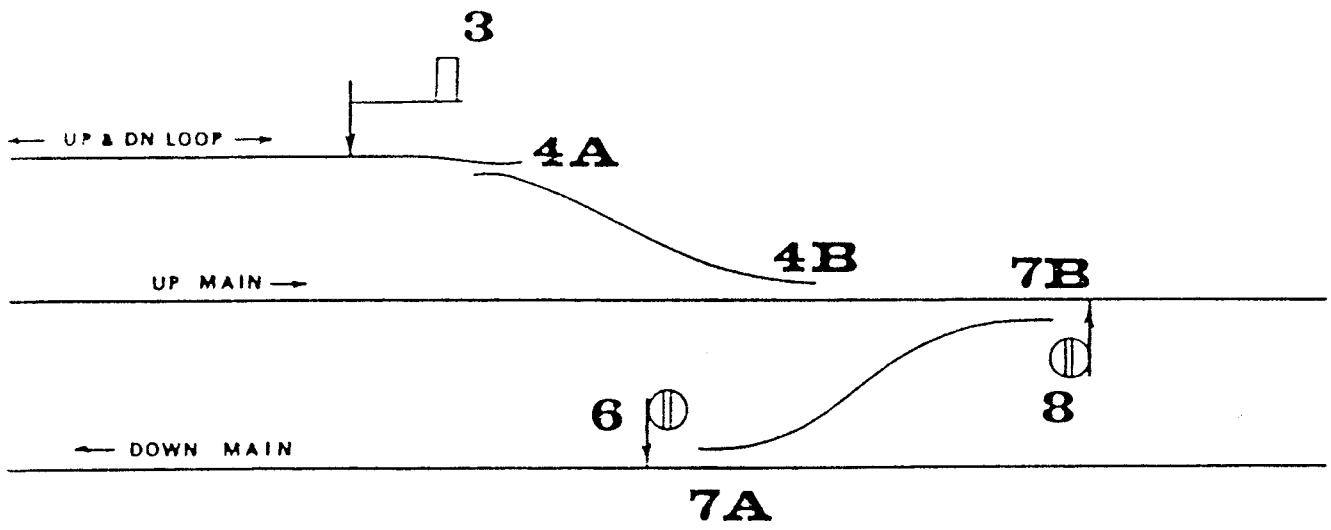


LEVER NO	RELEASED BY	LOCKS NORMAL	LOCKS BOTHWAYS	RELEASES
1				
2		4		
3	4			
4		2		3

continued

"Points also, where practicable, to be so interlocked as to avoid the risk of a collision."

Figure 3. Point to Point Locking

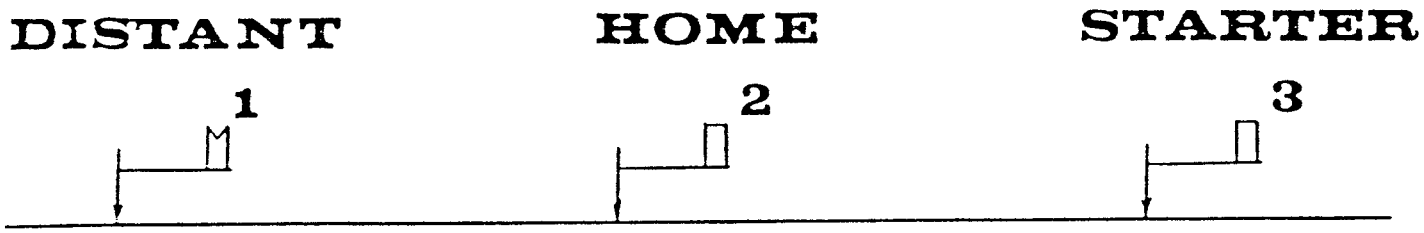


LEVER NO	RELEASED BY	LOCKS NORMAL	LOCKS BOTHWAYS	RELEASES
3	4	8		
4		7		8.3
6	7	8		
7		4		6.8
8	4 or 7	6.3		

continued

"Distant signal levers to be so interlocked that they cannot be pulled until the levers of all related Stop signals have been pulled."

Figure 4. Distant Signal Release

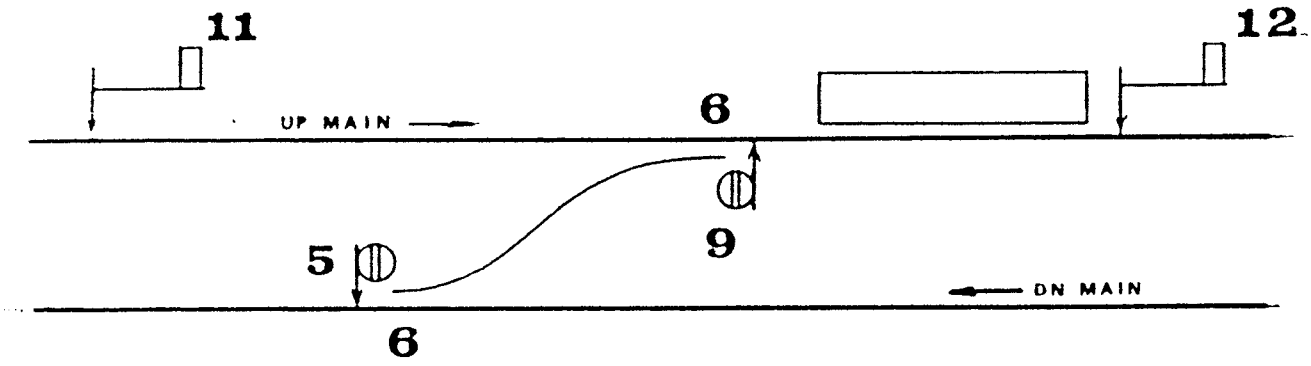


LEVER NO	RELEASED BY	LOCKS NORMAL	LOCKS BOTHWAYS	RELEASES
1	2.3			
2				1
3				1

continued

"Levers operating Stop signals next in advance of trailing points operated from the same box should, when worked, lock such point levers in either position, unless this locking will unduly interfere with traffic movements for which there is adequate space between the signals and points concerned."

Figure 5. Route Holding



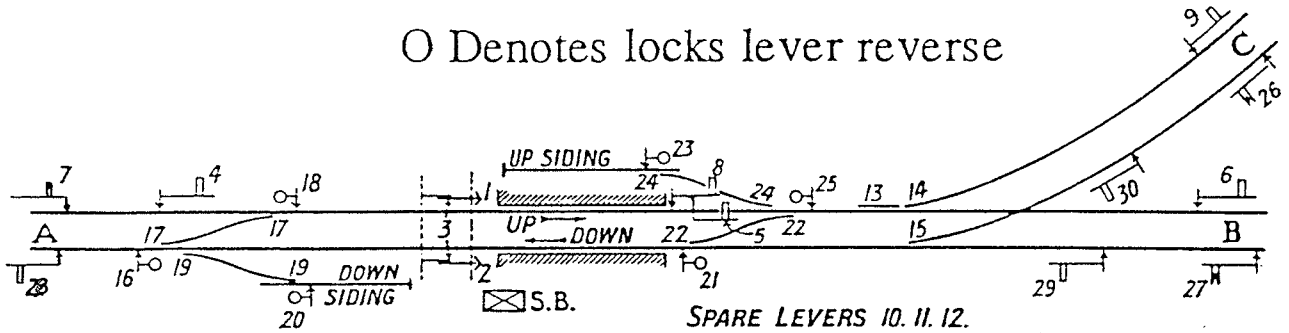
LEVER NO	RELEASED BY	LOCKS NORMAL	LOCKS BOTHWAYS	RELEASES
5	6	9		
6		11		9.5
9	6	5.12		
11		6		
12		9	6	

continued

Figure 6 is an example of a typical layout complete with locking figures.

If we apply Figures 1 to 5 to Figure 6 we are able to identify certain conditions on the locking figures.

Figure 6.



RELEASED BY	No	LOCKS
	1	
	2	
	3	4.29.30 (16W 19)(25W 24)
(28 NORMAL) 13	4	3.17.22.24.25
(28 NORMAL) 13	5	14.18.22.24.25 (17(17))
6.5.4	7	
(28 NORMAL) 14.13	8	18.22.24.25 (17(17))
	9	
	10	SPARE
	11	SPARE
	12	SPARE
	13	(14(14))
	14	5
14	15	17. 19.22.29

RELEASED BY	No	LOCKS
	16	18. 20.28.29.30. (17(17) 19(19) 22(22)) (3W 19) (25W (22))
	17	4. 15.19.22.24.29 (25 (14 (14) W (17))
17	18	5. 8. 16
	19	15. 17. 22.29
19	20	16
22. 13	21	25
	22	4.5. 8. 15.17.19.24.29
24. 13	23	25
	24	4.5.8.17.22
	25	4.5.8. 21. 23 (13(13) 14(14) 17(17) 22(22) 24(24) (3W24)(16W(17)) (16W (22))
30. 28	26	
29. 28	27	
	28	16 (17(17) 19(19))
(28 NORMAL)	29	3. 15. 16. 17. 19. 22
(28 NORMAL) 15	30	3. 16

Figure 2 was an example of a **"CONVERGING JUNCTION CONNECTION"** and if we take a look at Figure 6 there is an example of the same thing. If you look at 19 points you can see:-

29 SIGNAL LOCKS 19 POINTS and

20 SIGNAL IS RELEASED BY 19 POINTS.

Therefore if a route is set along the "Down Line", and 29 Signal lever is reverse then 19 points are locked.

If we cannot pull 19 point lever reverse we will be unable to release 20 Signal lever, thus preventing a collision.

continued

Figure 4 was an example of **"A DISTANT SIGNAL RELEASE"**, and as you should now know a Distant signal is a warning signal. When at caution it tells the driver to be prepared to stop at the next signal.

When cleared they indicate that all the running signals ahead to which the distant signal refers to are off.

Distant signal levers cannot therefore be pulled unless the levers of such stop signals ahead are reverse. In Figure 6, therefore:-

7 SIGNAL LEVER IS RELEASED BY 4, 5 and 6 LEVERS REVERSE.

26 SIGNAL LEVER IS RELEASED BY 28 and 30 LEVERS REVERSE.

27 SIGNAL LEVER IS RELEASED BY 28 and 29 LEVERS REVERSE.

Figure 5 was an example of **"ROUTE HOLDING"** in which we looked at how Starting signals hold all points in rear of them in both the normal and reverse positions, to prevent the road from being altered after the signals in rear have been put to danger. There is an example of route holding in Figure 6:-

SIGNAL LEVERS 5 and 8 LOCK 17 POINT LEVER NORMAL AND REVERSE (BOTHWAYS).

continued

The Department of Transport is quite prepared not to insist on this rear locking where the signal concerned is at least a full trains length ahead of the connection.

For instance, if in Figure 6 the distance between 28 signal and 17 points is more than sufficient to accommodate the longest train, then 28 signal need not interlock 17 points.

If this locking were provided, in the case of an up to down movement through 17 points, the up line would be blocked unnecessarily, as the signalman would have to wait until the train had passed 28 signal on the down road before he could restore 17 points to normal and clear the up road for an approaching train. It should also be mentioned in this connection that considerable relief is afforded in mechanical locking at installations where track circuiting exists, as the track circuit can be made to hold the road in a much more efficient manner than mechanical locking.

continued

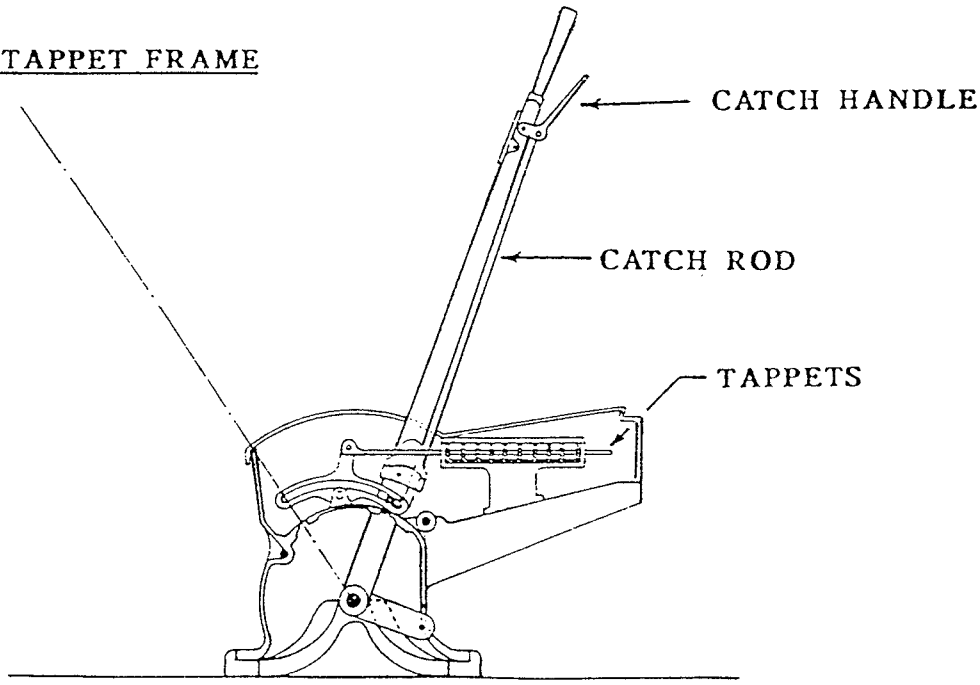
LOCKING CHARTS

INTRODUCTION

When the table of **"LOCKING FIGURES"** have been prepared, the next stage is to show on paper how the locking will be made to function in the frame.

To interlock mechanically one lever with others in the frame, there must be a physical connection between them, and to accomplish this, every type of frame has some device for converting the backward and forward movement of the lever into a longitudinal movement at right angles to the lever movement. There are many types of locking frame on British Rail and almost as many different types of locking, but as all mechanical locking works on the same principle, once one method is fully understood it is then an easy matter to deal with any other. One of the simplest ways is shown in the diagram below.

STANDARD 1943 TAPPET FRAME



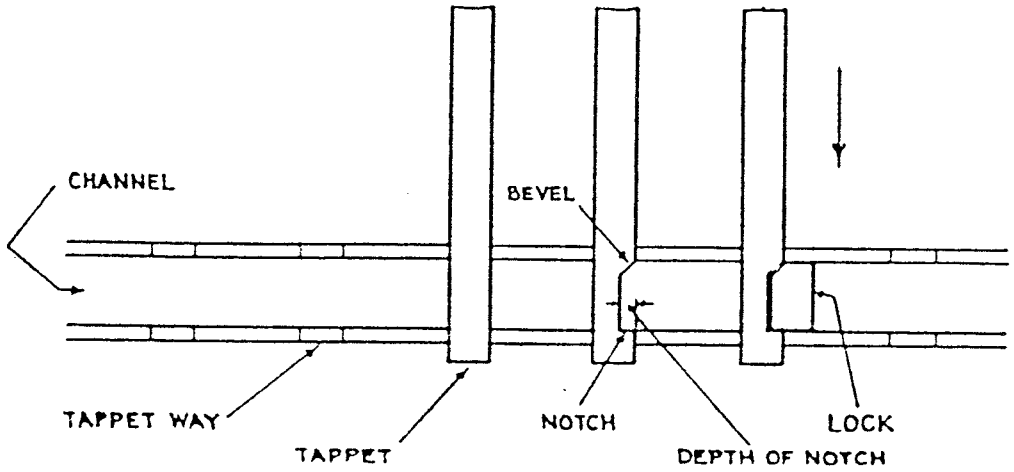
continued

A flat bar of mild steel (called a tappet) is attached to each lever with its free end resting in a locking box.

Throughout the length of the locking box, slots (called tappet ways) are cut opposite each lever, and when a lever is pulled, the tappet slides through the slot.

A plan view of a locking box and tappet is shown in the diagram below. The tappet is a good sliding fit in the tappet way and there is no lateral movement. A notch is cut in the side of a tappet and a lock with a bevel cut to fit the notch is fitted to it.

When the lever is pulled, the tappet will travel in the direction of the arrow and the bevel of the notch will push on the bevel of the lock and will drive the lock out.



If now a bar is laid in the box and attached to the lock, the lock will move the bar, and if a second lock and tappet are provided at the other end of the bar, the movement of the first tappet will drive the lock into the second tappet.

continued

INTERLOCKING OF LEVERS

ONE LEVER LOCKING ANOTHER (FIGURES 1A, 1B, 2A 2B).

1 LOCKS 2

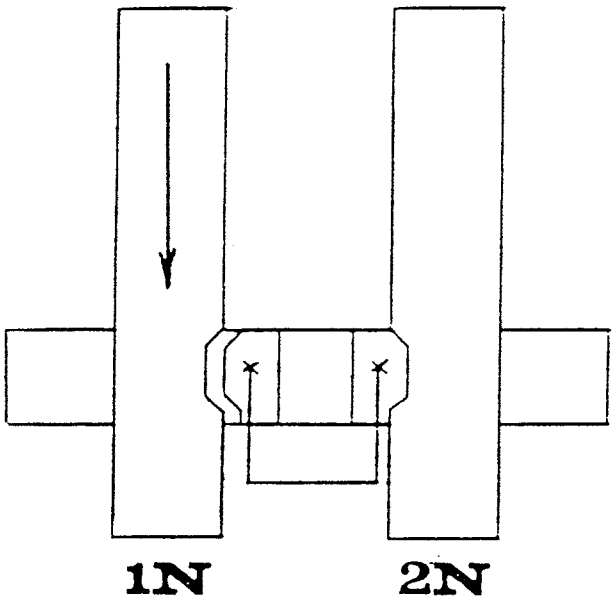


Figure 1A.

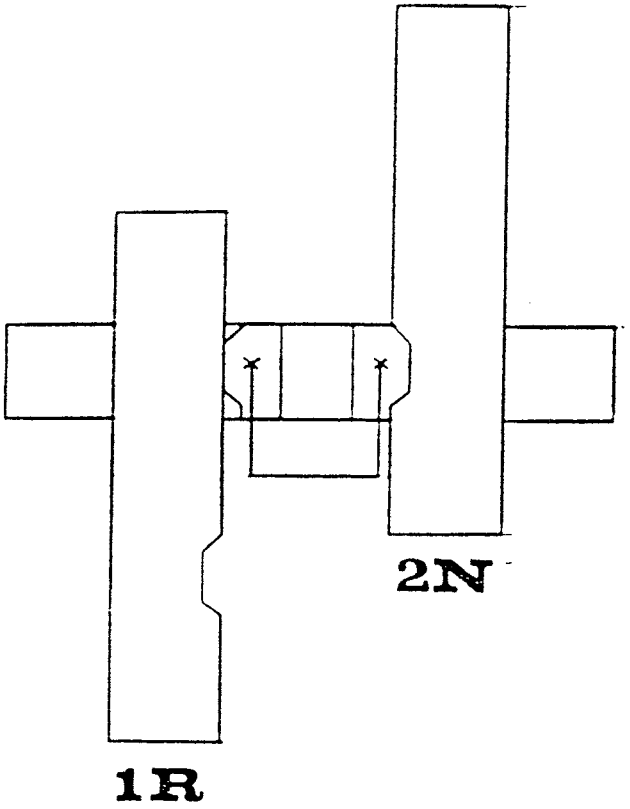


Figure 1B.

In Figure 1A when lever No1 is pulled, the tappet will move in the direction of the arrow. After this has taken place the positions of the locks and tappets will be as in Figure 1B.

This is 1 locks 2. Lever No1 is now reverse and if lever No 2 is tried it will be found to be locked, for the lock in lever No 2's tappet cannot be driven to the left because it is being held firmly by the lock against lever No 1's tappet, and lever No 2 will only be free to be pulled when lever No 1 has been replaced normal and the notch is again opposite the lock.

continued

Similarly when lever No 2 is pulled reverse, the arrangement of locks and tappets will be as in Figure 2B and 2 will lock 1. Since the two locks are rigidly connected together by the bar, it will be seen that if 1 locks 2, then it must follow that 2 will lock 1 so that the locking is reciprocal and the converse is automatically provided.

2 LOCKS 1

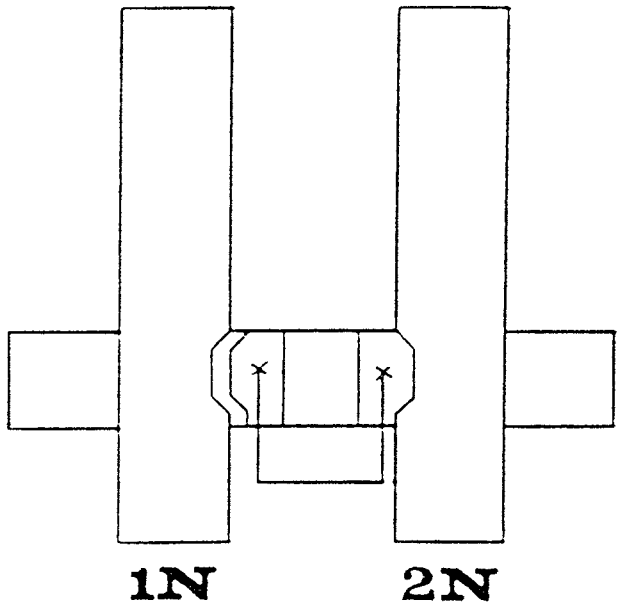


Figure 2A.

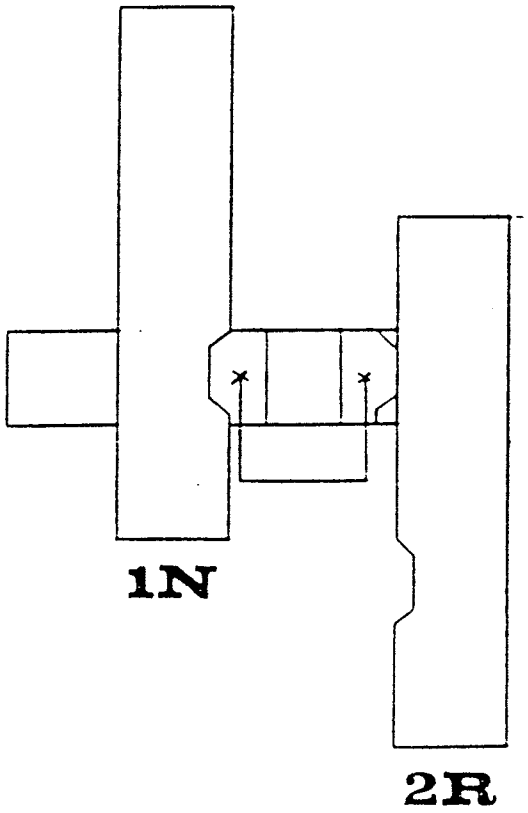


Figure 2B.

continued

ONE LEVER RELEASED BY ANOTHER (FIGURE 3)

1 RELEASED BY 2

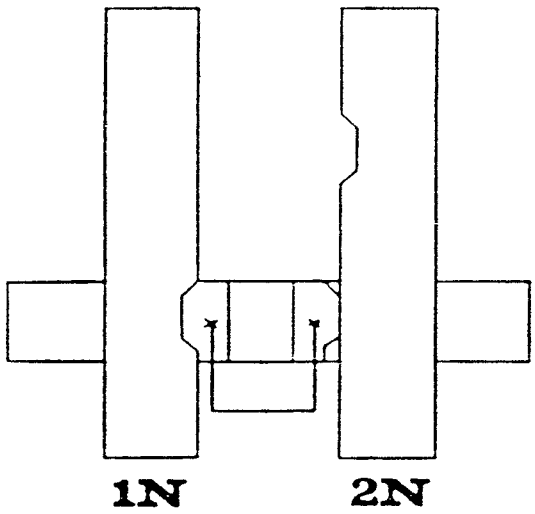


Figure 3A.

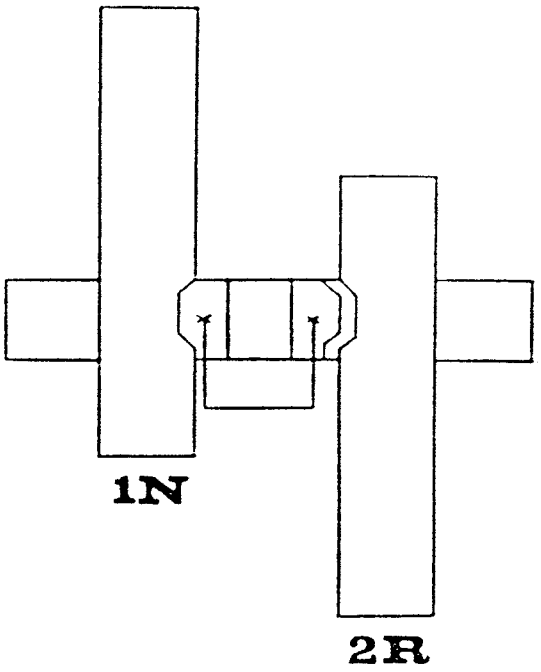


Figure 3B.

Lever No 1 cannot be pulled because the tappet cannot drive the lock to the right as the lock at 2 tappet is not free to move. If a notch is cut in 2 tappet so that it comes opposite the lock when the lever is reversed, then, when 2 lever is reversed,1 lever is free to move the bar and so drive the lock into 2 tappet.

continued

This means that 1 is released by 2 and the arrangement with 1 lever pulled reverse, is shown in Figure 3C.

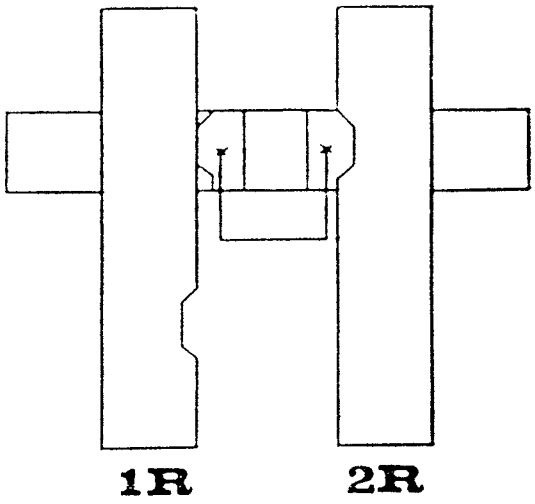


Figure 3C.

It is not now possible to replace lever 2, as the lock cannot be driven out because the bar is held firm by the lock at 1 tappet, therefore 1 locks 2 reversed.

continued

ONE LEVER LOCKING ANOTHER IN EITHER POSITION (FIGURE 4)

1 LOCKS 2 BOTHWAYS

This is lever 1 locks lever 2 in the normal position or the reverse position. This is accomplished by cutting two notches in lever 2's tappet, one in the normal position and one in the reversed position.

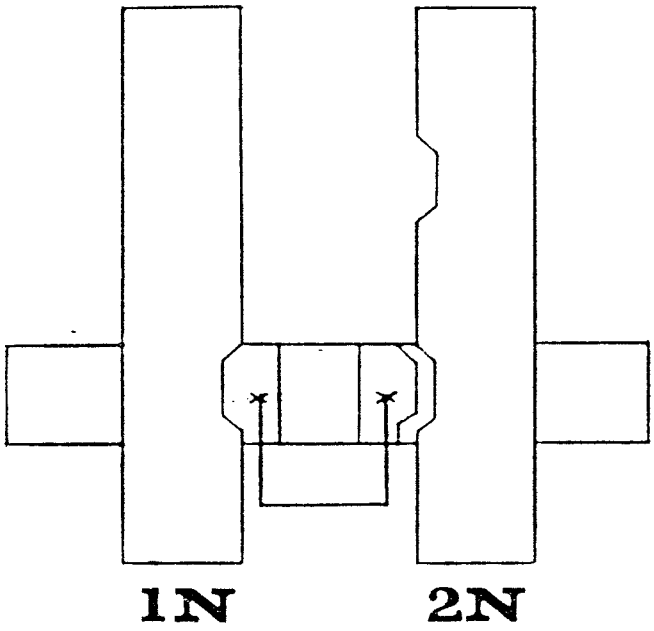


Figure 4A.

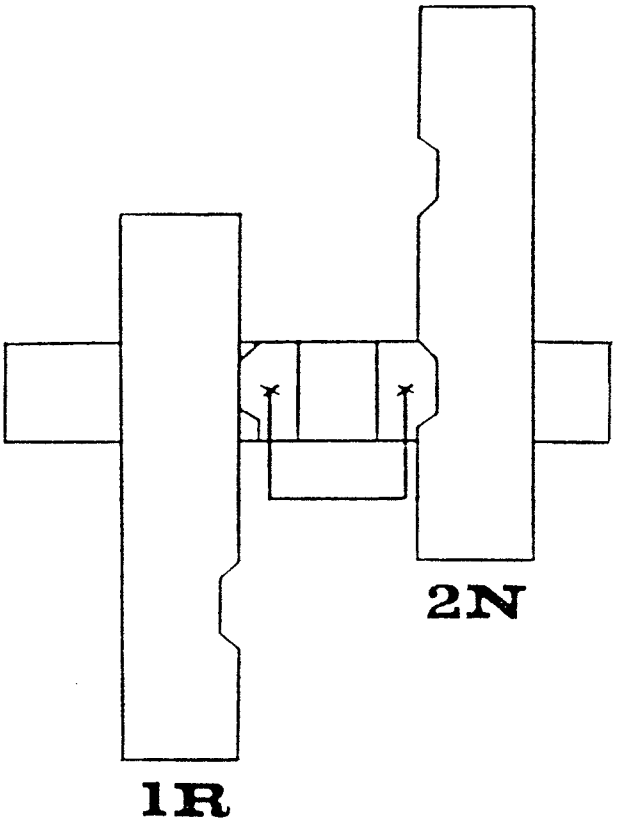


Figure 4B.

continued

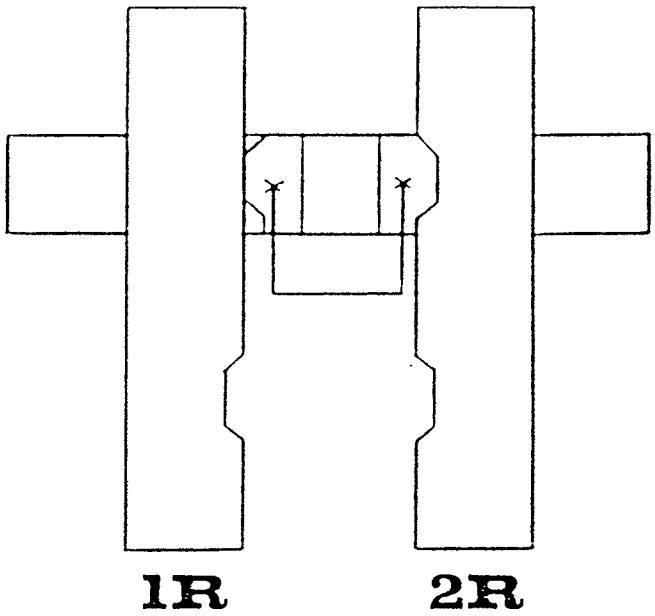


Figure 4C.

continued

CONDITIONAL LOCKING (FIGURE 5)

7 LOCKS 9 WITH 8 REVERSE

With a long continuous tappet passing through all the channels, it is obviously impossible to make a tappet slide when conditional locking is required, and the method adopted in this case, is to put a small sliding tappet on top of the long one, in the channel in which it is required, making it long enough so that when the tappet travels from normal to reverse, the small slider is always in the channel and in contact with the locks that operate it.

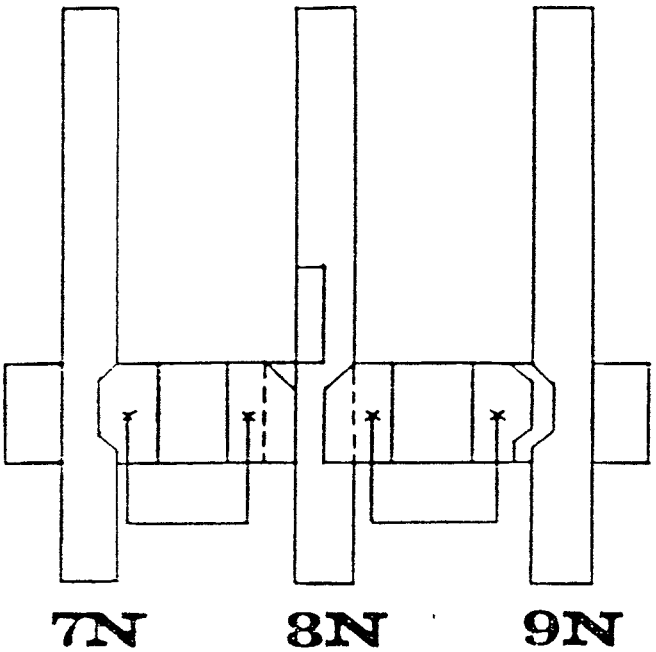


Figure 5A.

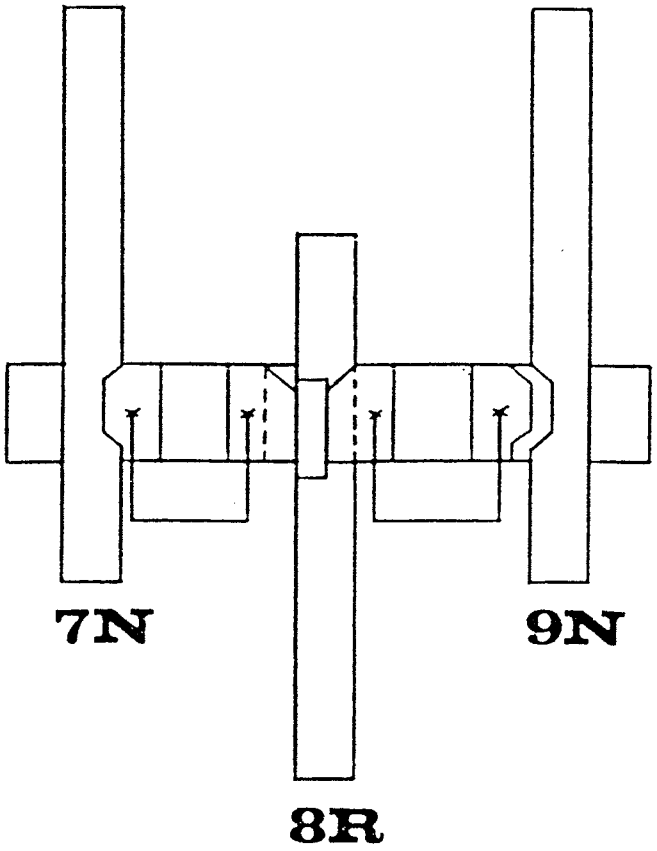


Figure 5B.

If lever 8 is pulled reverse the slider will travel with the tappet in the direction of the arrow and come between the two locks.

continued

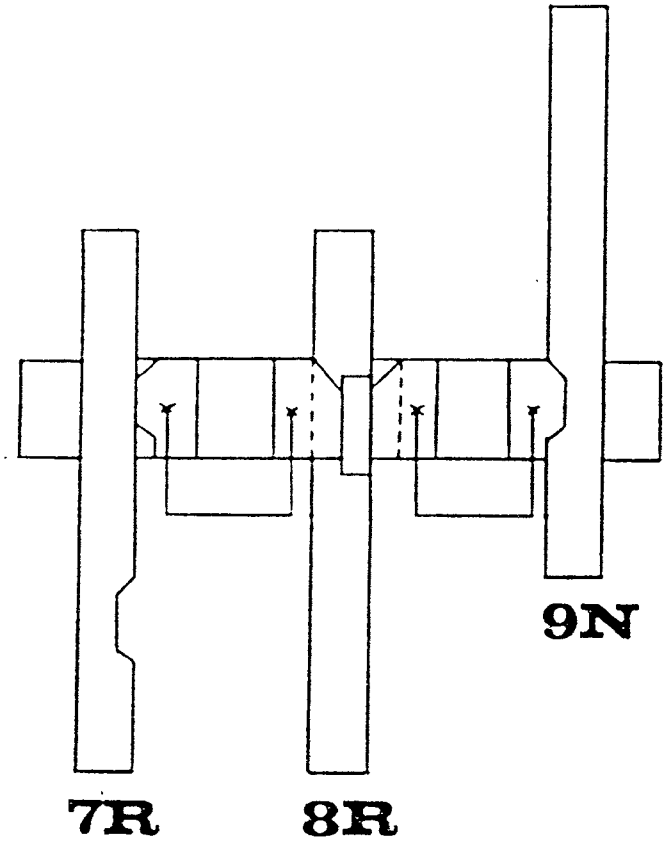


Figure 5C.

When lever 7 is pulled reverse it drives the lock to the right, this in turn push's the lock on 8's tappet and so moves the slider to the right. This in turn drives the lock into 9's tappet.

We now have 7 locks 9 with 8 reverse.

If lever No 9 is tried it will be found to be locked, for the lock in lever No 9's tappet cannot be driven to the left because it is being held firmly by the lock against lever No 7's tappet.

continued

9 LOCKS 7 WITH 8 REVERSE

Similarly when lever No 8 is reverse and lever No 9 is pulled reverse, the arrangement of locks and tappets will be as in Figure 6C and 9 locks 7 with 8 reverse.

It will be seen that if 7 locks 9 with 8 reverse, then it must follow that 9 will lock 7 with 8 reverse, so that the locking is reciprocal and the converse is automatically provided.

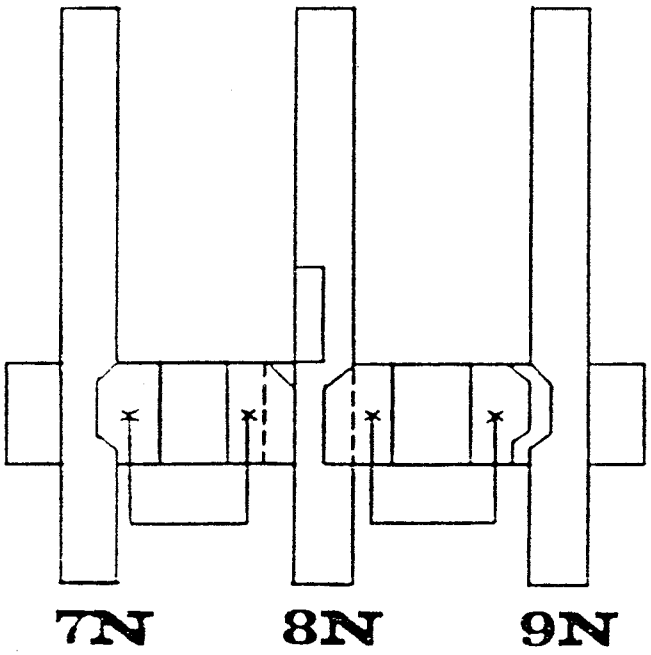


Figure 6A.

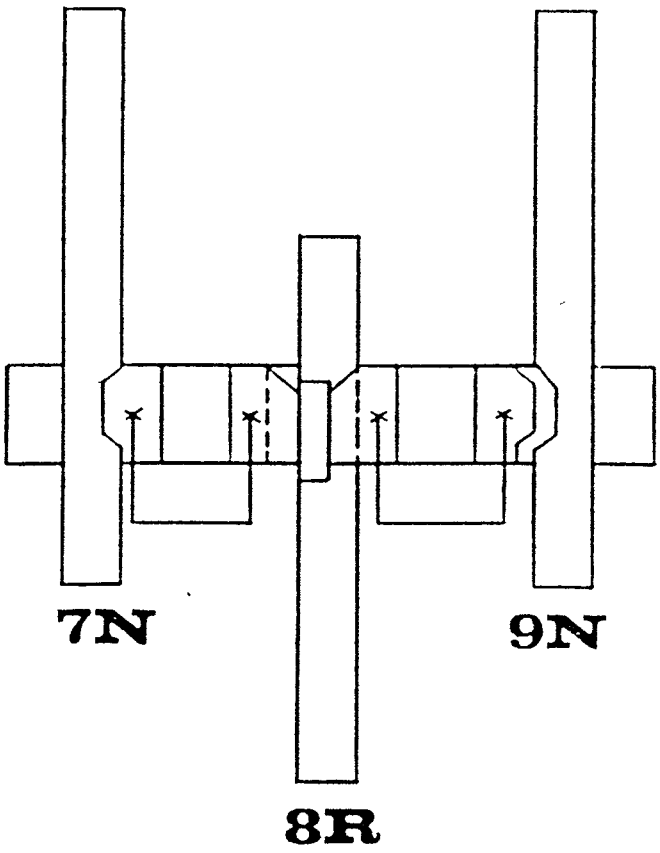


Figure 6B.

continued

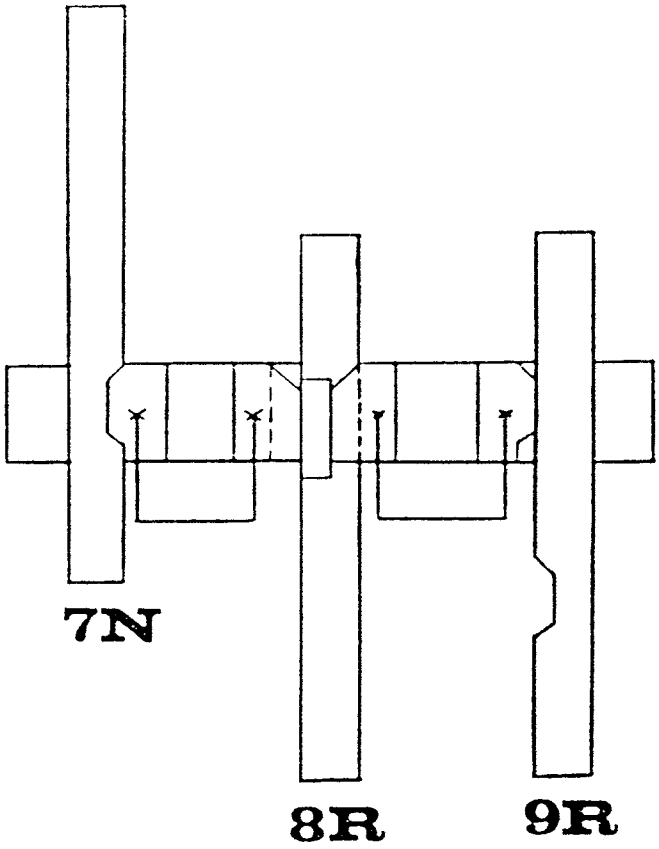


Figure 6C.

continued

SEQUENTIAL LOCKING

Sequential locking compels a signal lever to be restored to normal before that working the rear signal can be pulled again. Referring back to Figure 6 in the section on locking figures and looking at signals 4, 5 & 8 in particular the sequential locking between these levers would be written below the locking table in the following manner:-

MECHANICAL SEQUENTIAL 5 LOCKS 4 NORMAL

MECHANICAL SEQUENTIAL 8 LOCKS 4 NORMAL

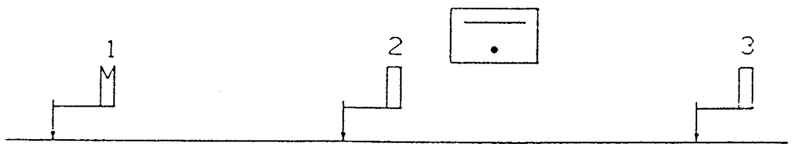
Figure 7 illustrates how mechanical sequential locking is achieved on a Standard 1943 Tappet Frame.

The sequential locking for Figure 7 would be written as follows:-

MECHANICAL SEQUENTIAL 3 LOCKS 2 NORMAL

continued

Sequential Locking on a Standard 1943 Interlocking Frame



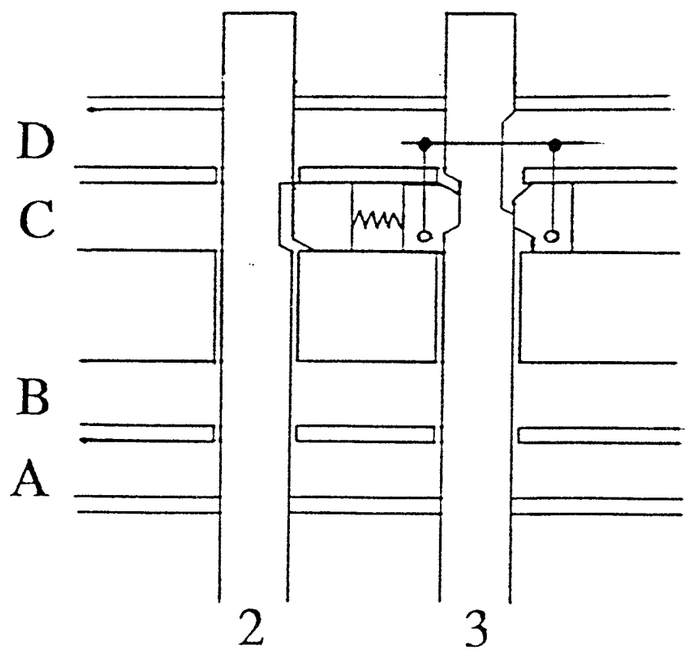
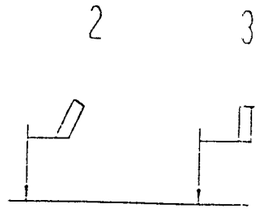


FIGURE 7A.



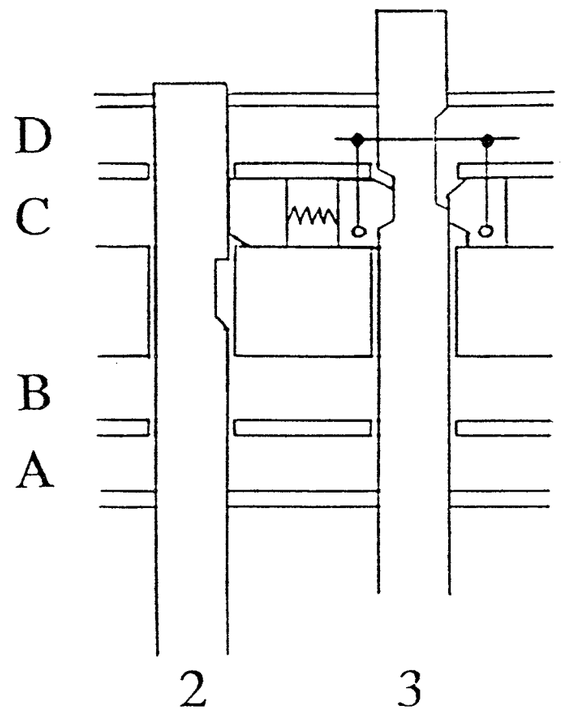


FIGURE 7B.

continued

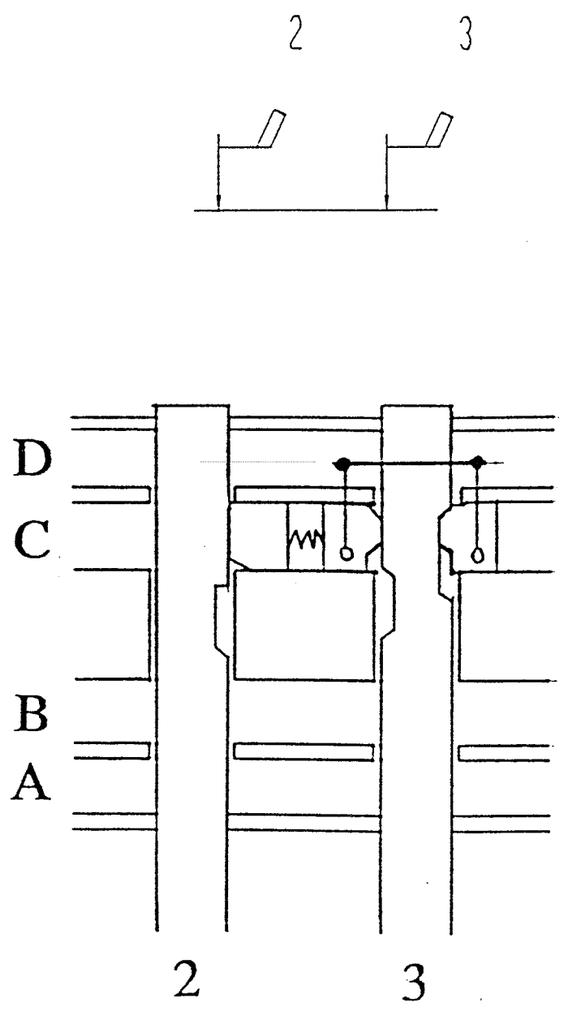


FIGURE 7C.

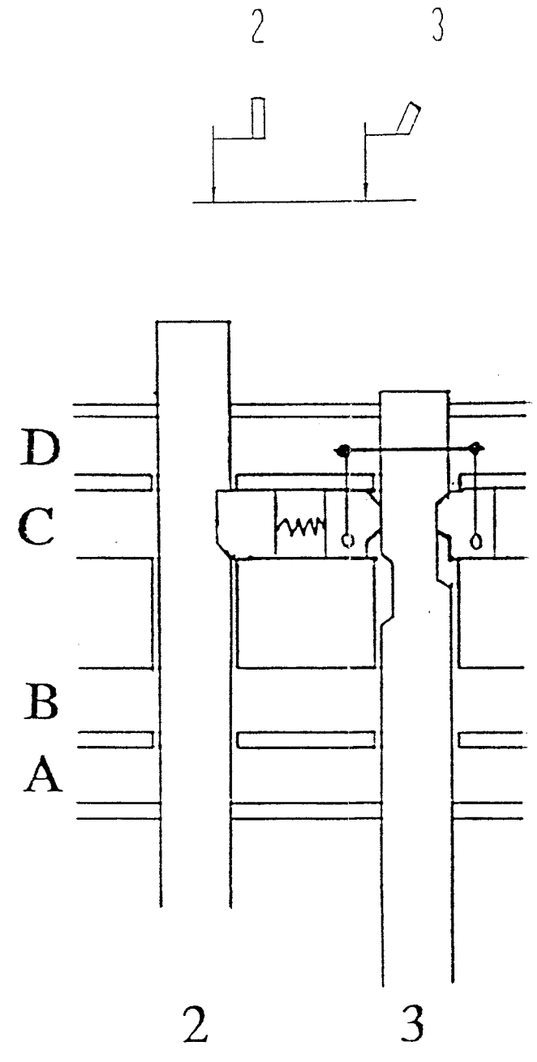


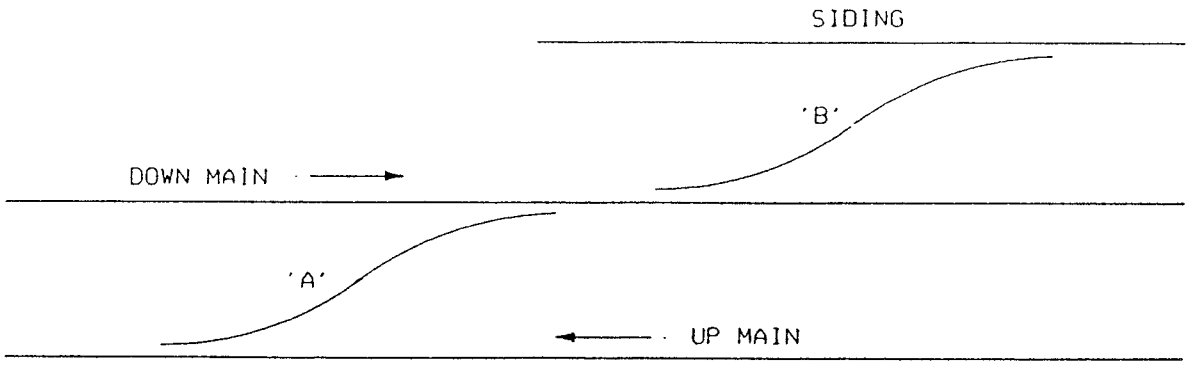
FIGURE 7D.

continued

NAME AND PULL PLATES

POINTS

Figure 1.



"A" IS TRAILING THEREFORE IS A CROSSOVER.

"B" IS FACING THEREFORE IS A CROSSING.

If points are double ended the nameplate will be written as follows:-

"A" CROSSOVER - UP & DOWN MAIN.

"B" CROSSING - DOWN MAIN & SIDING.

continued

If points are single ended the nameplate will be written as follows:-

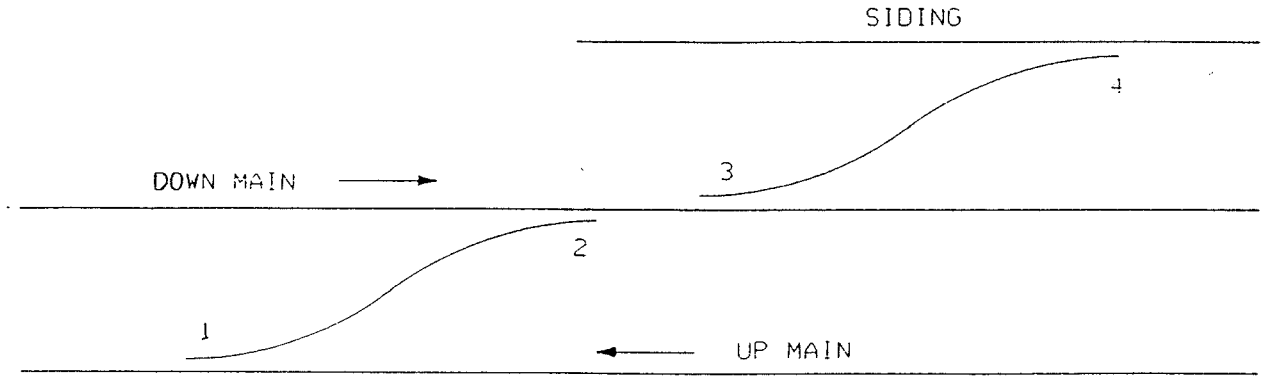
1. **CROSSOVER - UP MAIN FROM DOWN MAIN.**

2. **CROSSOVER - DOWN MAIN FROM UP MAIN.**

3. **CROSSING - DOWN MAIN TO SIDING.**

4. **CROSSING - SIDING FROM DOWN MAIN.**

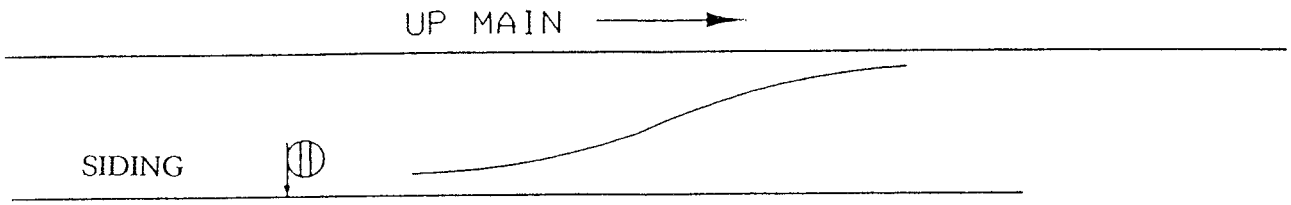
Figure 2.



continued

SIGNALS

Figure 3.

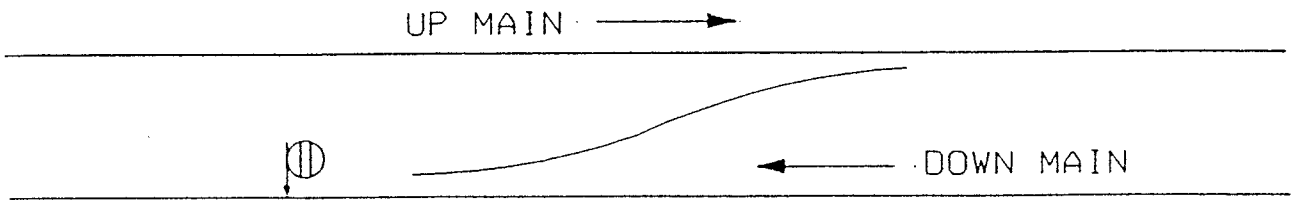


Nameplate to read:-

UP SIDING TO UP MAIN

N.B Do not specify a **"SHUNT"** or any other signal description from a siding.

Figure 4.



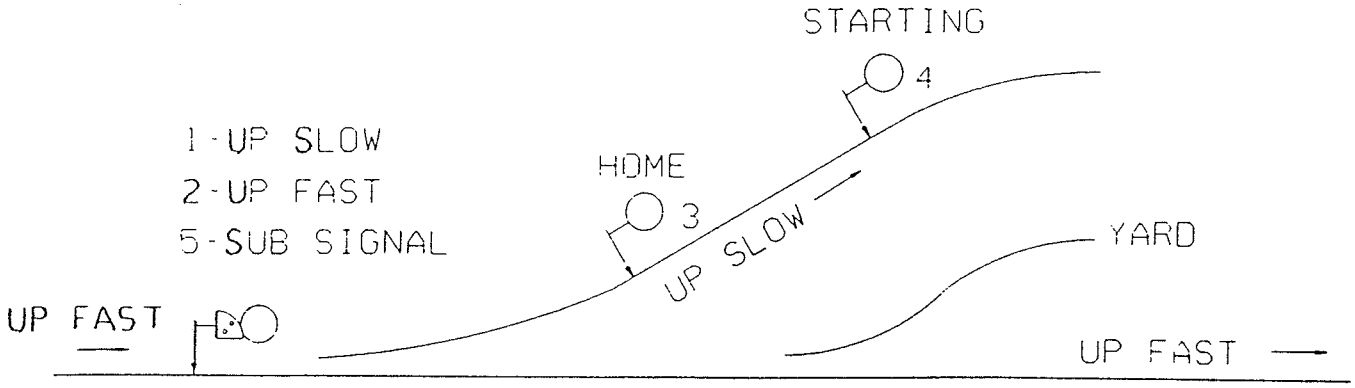
Nameplate to read:-

SHUNT - DOWN MAIN TO UP MAIN

N.B A shunt denotes a move starting against the normal flow of traffic.

continued

Figure 5.



Nameplates to read:-

1. **HOME 1 - UP FAST TO UP SLOW.**

2. **HOME - UP FAST.**

3. **HOME 2 - UP SLOW.**

4. **STARTING - UP SLOW.**

5. **HOME - UP FAST TO YARD.**

General notes:-

A preceded signal has all the final routes in its nameplate. No two nameplates to read the same.

continued

STANDARD COLOURS TO BE USED ON LOCKING FRAMES

Quadrants Catch Blocks & Boxes	Black
Whole Of Frame Below Floor Line	Grey

LEVERS CONTROLLING:-

Distant Signals	Yellow
Stop Signals Ground Signals Route Levers (Controlling Route Indicators) Lever Collars	Red
F.P. Locks Clearance Bars	Blue
Points Scotches Derailers	Black
Wicket Gates Gate Stops Or Locks Bridge Locks Turntable Locks	Brown
Gongs Asking Levers	Green
Spare Levers	White
Release Levers Switch Levers Annetts Key Levers Boltlocking Levers	(Top Half Blue (Bottom Half Brown

continued

Acceptance Levers	(Top Half Red (Bottom Half Brown
King Levers	(Alternate Brown & (White 3 Inch (Horizintal Stripes
Detonators	(Alternate Black & (White 4 Inch (Chevrons. Chevrons (To Point Upwards (For Up Line. (Chevrons To Point (Downwards For (Down Line.
Signals Working With Detonator Placers	(Top Half Red (Bottom Half Alternate (Black & White 4 Inch (Chevrons. Chevron (To Point Upwards (For Up Line. Chevron (To Point Downwards (For Down Line.
Indicators Fog Signalling & Signal Box	(Top Third Red (Middle Third White (Bottom Third Black

Colours to be in accordance with B.S. 381C - 1948 as follows:-
Red No. 537, Yellow No. 356, Green No. 221, Blue No. 166, Brown No. 411, Grey No 632.

Any lever which is released from another signal box eg. line clear release or underbolt. To have a 3 inch horizontal white stripe half way down lever.

In cases of levers painted in alternate stripes. These to commence with black or brown at the quadrant end of lever.

In cases where a lever controls two functions eg. F.P. lock working with points. Intermediate block home & distant signals, both colours to be used. The colour used on top half of lever to represent that apparatus moving first.

continued

1943 STANDARD LMR FRAME 4 1/2" CENTRES

The standard LMR frame utilizes "reduced tappet travel". The reduction in travel is accomplished by introducing an escapement device between the lever and the tappet, so that for the greater portion of the movement of the lever, no motion is given to the tappet.

On a standard LMR frame the tappet is operated by the movement of the catch handle. This is referred to as

"CATCH HANDLE LOCKING"

If we look at Figure 1 on grasping the catch handle, the stud at the bottom of the catch rod tilts the cam from right to left, which in turn moves the tappet a short distance, also from right to left. The lever travels over with the stud riding in the slot but not moving the cam.

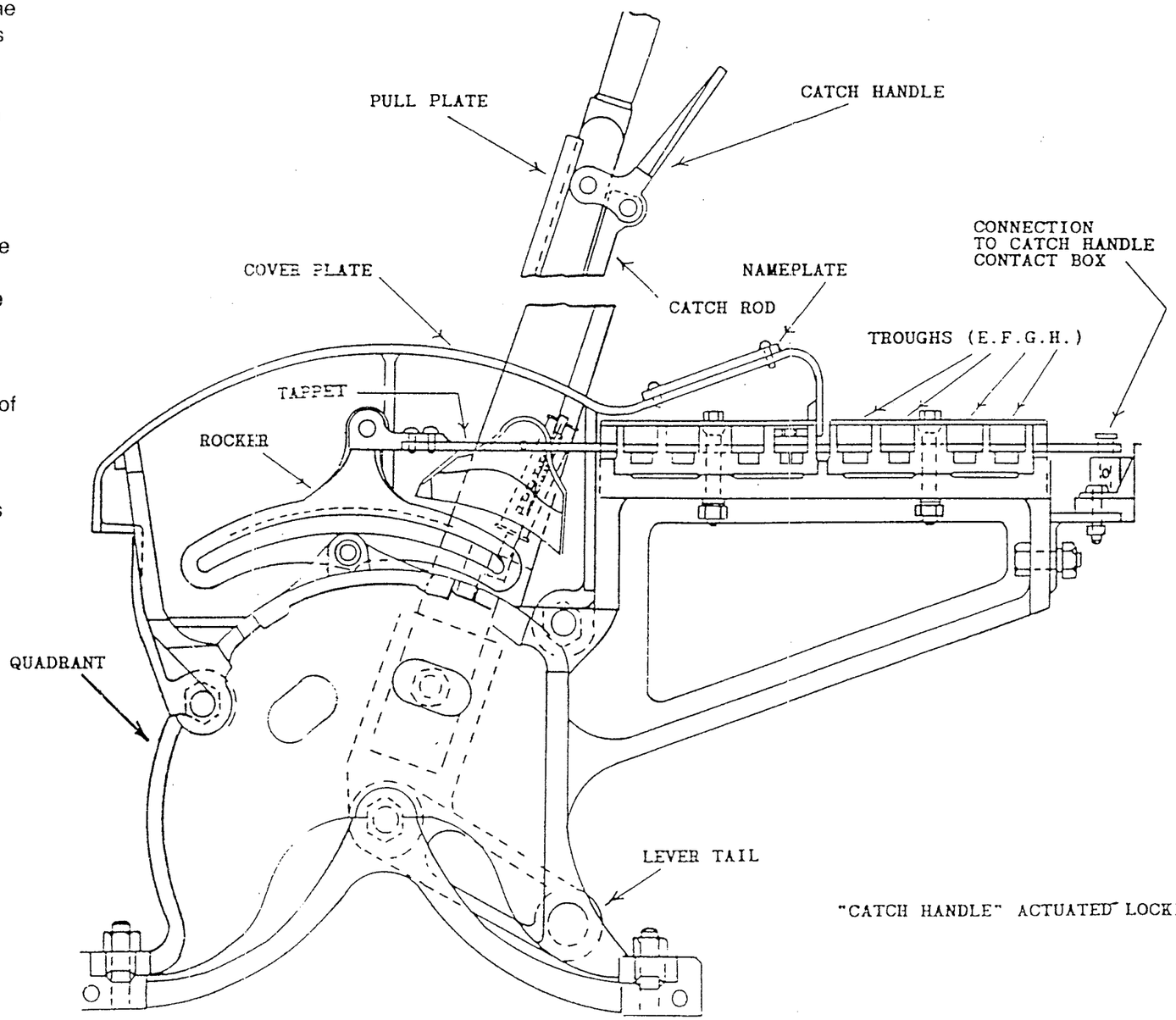
When the lever is reversed the catch handle is released and the stud travelling downward, tilts the cam again in the same direction, thus completing the travel of the tappet.

The reason for operating the tappet by the catch handle is, that for every movement of the lever, the catch handle has to be operated, and if the tappet is locked, the catch handle cannot be moved.

Consequently, the signalman knows immediately he grasps the handle that the lever is locked.

Another feature of this type of locking is, that since only a small force is necessary to grasp the catch handle and so operate the locking, the actual locking mechanism can be of much lighter construction than that which is operated by the lever itself.

Figure 2 shows an example of the locking table and associated figures for a standard LMR tappet frame.

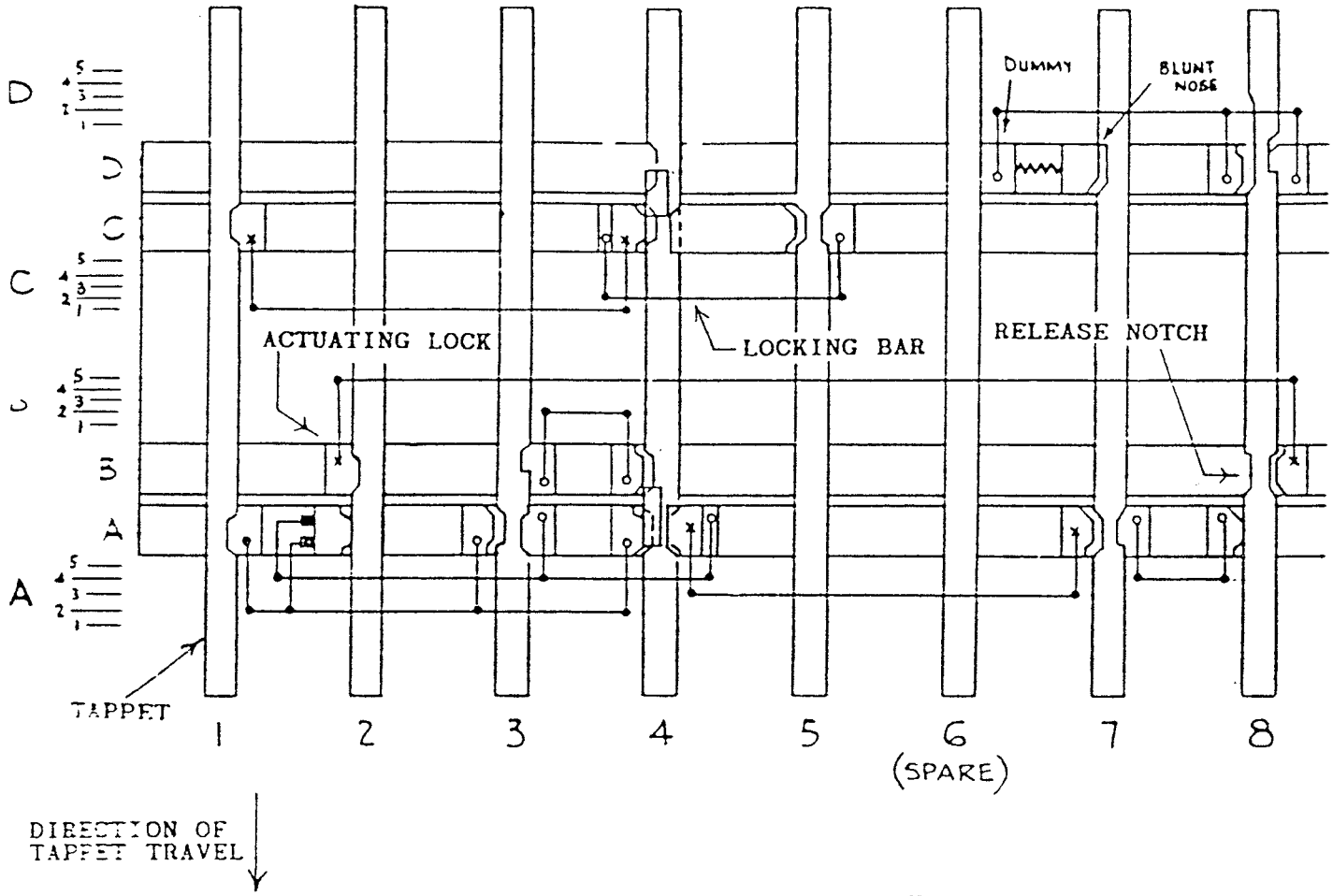


"CATCH HANDLE" ACTUATED LOCKING

FIGURE 1.

continued

Figure 2.



NO.	RELD BY	LOCKS NORMAL	LOCKS B.W	RELEASES	BAR MARKING
1	2	3(5W4R) (7W4N)	4		2A1-4. 3A 4-7 C1-4 C4-5
2		8		1.3 4	5B 2-8
3	2	1.4			2B 3-4
4	2	3			4A 2-4
5		(1W4R)	4		2C 4-5
6	SPARE				
7	8				4A 7-8
8		2 (7 SEQ)			2D 6-8

BAR NUMBER
TROUGH LETTER

continued

LNWR TUMBLER FRAME 5 1/2" CENTRES

The LNWR Tumbler frame is an example of

"LEVER ACTUATED LOCKING".

The LNWR Tumbler frame is another example of further type of locking frame, with reduced travel, non-tappet locking which is actuated by the lever.

A tumbler is fixed to the lever which, when the lever is pulled, turns on its pivot and through a coupling raises a vertical rod **(called a hook rack)**.

Each lever has a hook rack and these have square notches **(called ports)** cut in them equally spaced at 2 in. centres.

Horizontal bars are placed in front of the racks and on these can be riveted studs to engage in the ports in the racks.

A lever moves a bar by means of a small crank which is bolted to the structure of the frame. One arm of the crank is permanently engaged in a port in the hook rack, the other being forked to fit round a stud riveted in the bar.

When the hook rack is raised by the lever, the bar is moved to the left and can lock or release other hook racks by means of studs riveted on the bar.

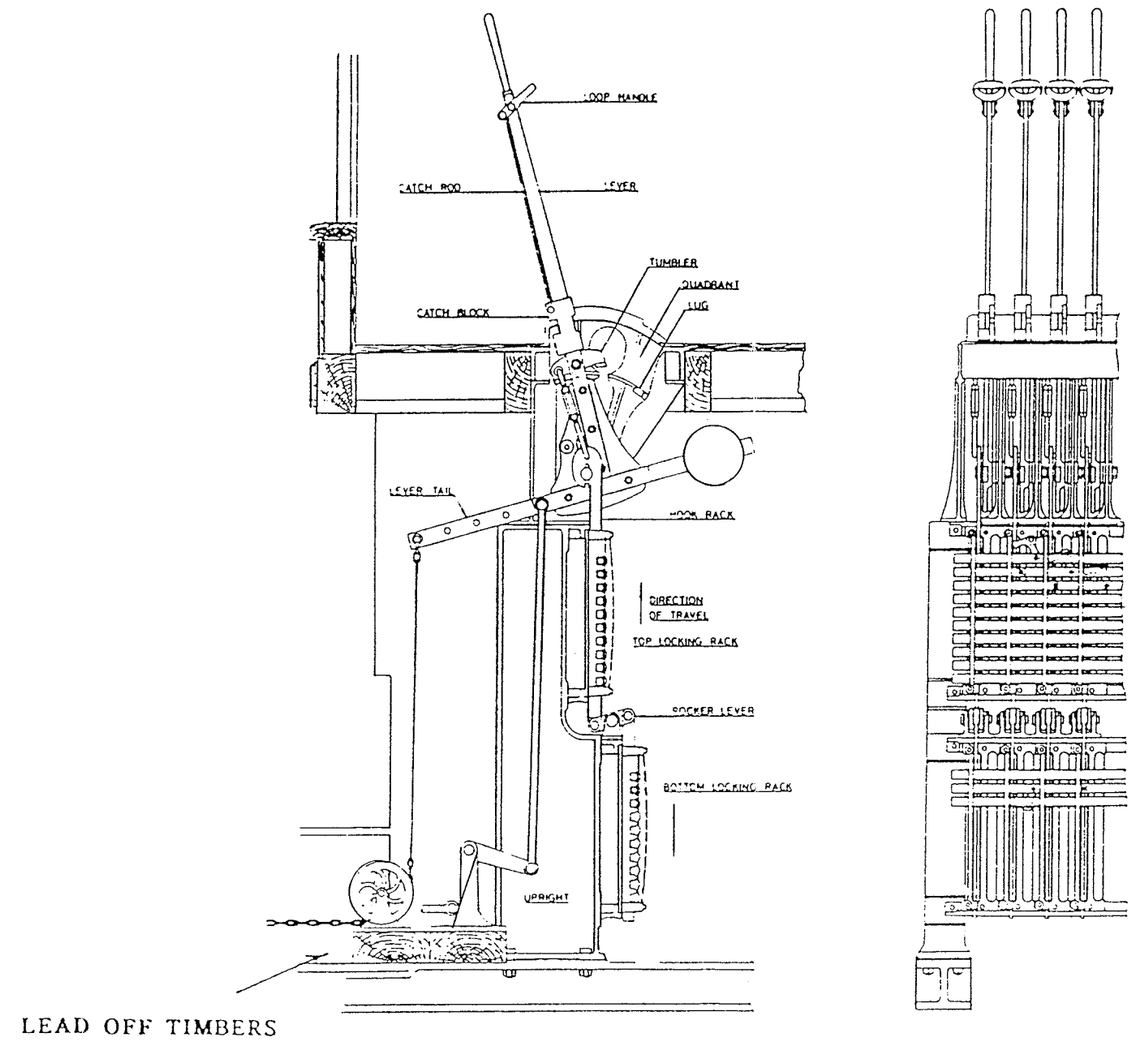


FIGURE 3.

continued

Let us now look at an example of the locking on a tumbler frame. Referring to Figure 4.

"16 LOCKS 15" (BAR No.1)

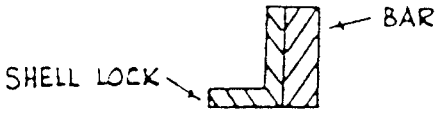
When 16 hook rack is raised, it will operate the crank and move the bar to the left and will push the stud **(called a full lock)** into the hook rack on lever No.15. Conversely, if 15 hook rack is raised first, the port will move out of alignment with the lock so that the bar cannot be pulled.

"17 RELEASED BY 18" (BAR No.3)

The lock in 17 hook rack is placed in the port so that the hook rack cannot be moved until 18 lever has been pulled and so pushed the lock out. After 17 lever has been pulled, the port of the hook rack is out of alignment with the lock so that 18 cannot be put back until 17 has first been replaced.

continued

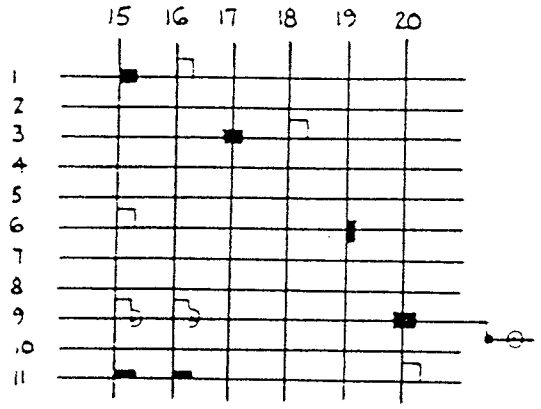
Figure 4A.



No.	Rel. By	Locks N.	Locks B/W	Releases
15		16		
16		15		
17	18			
18				17
19			15	
20	15 or 16		15.16	

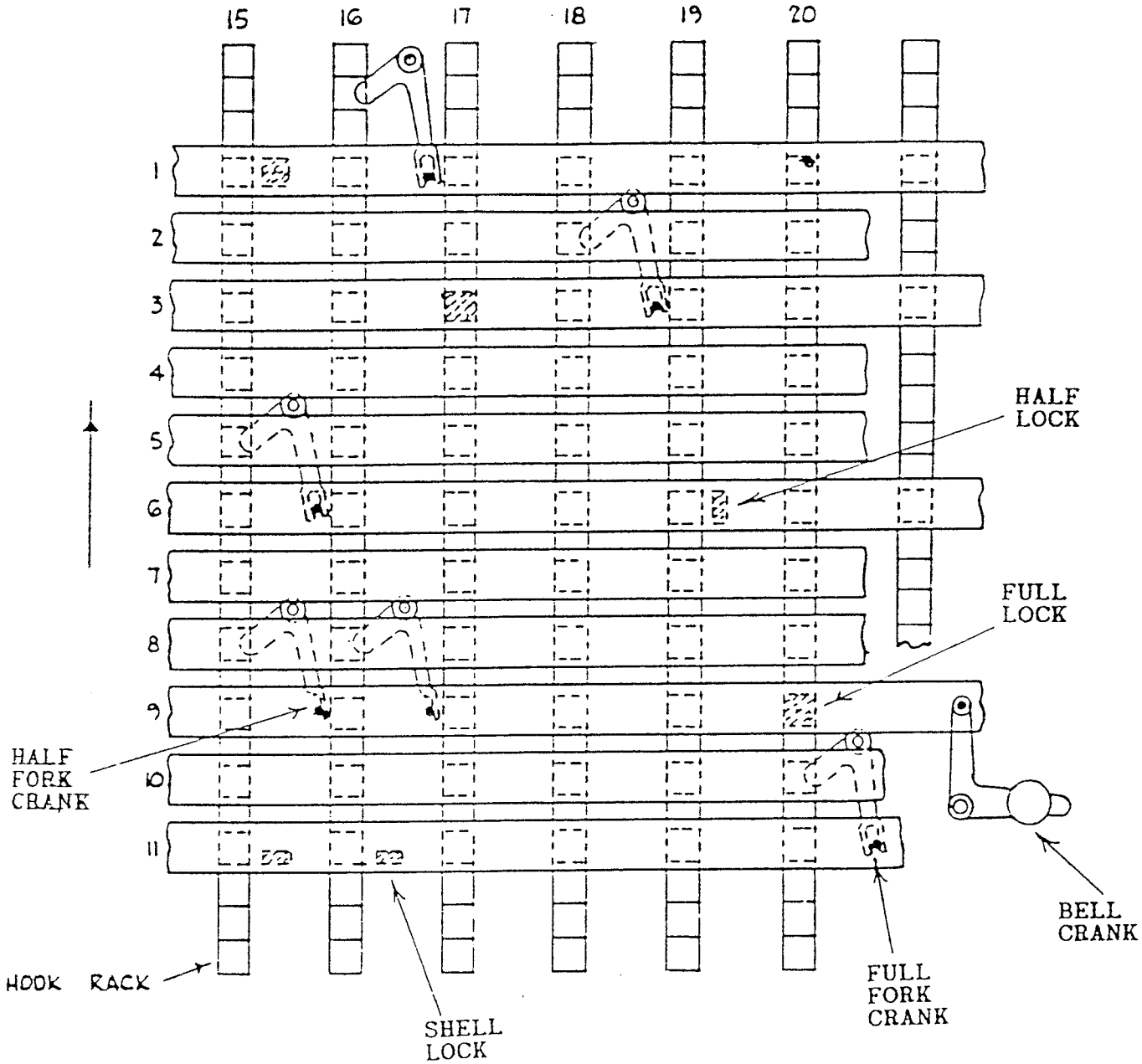
BACK LOCK

Figure 4B.



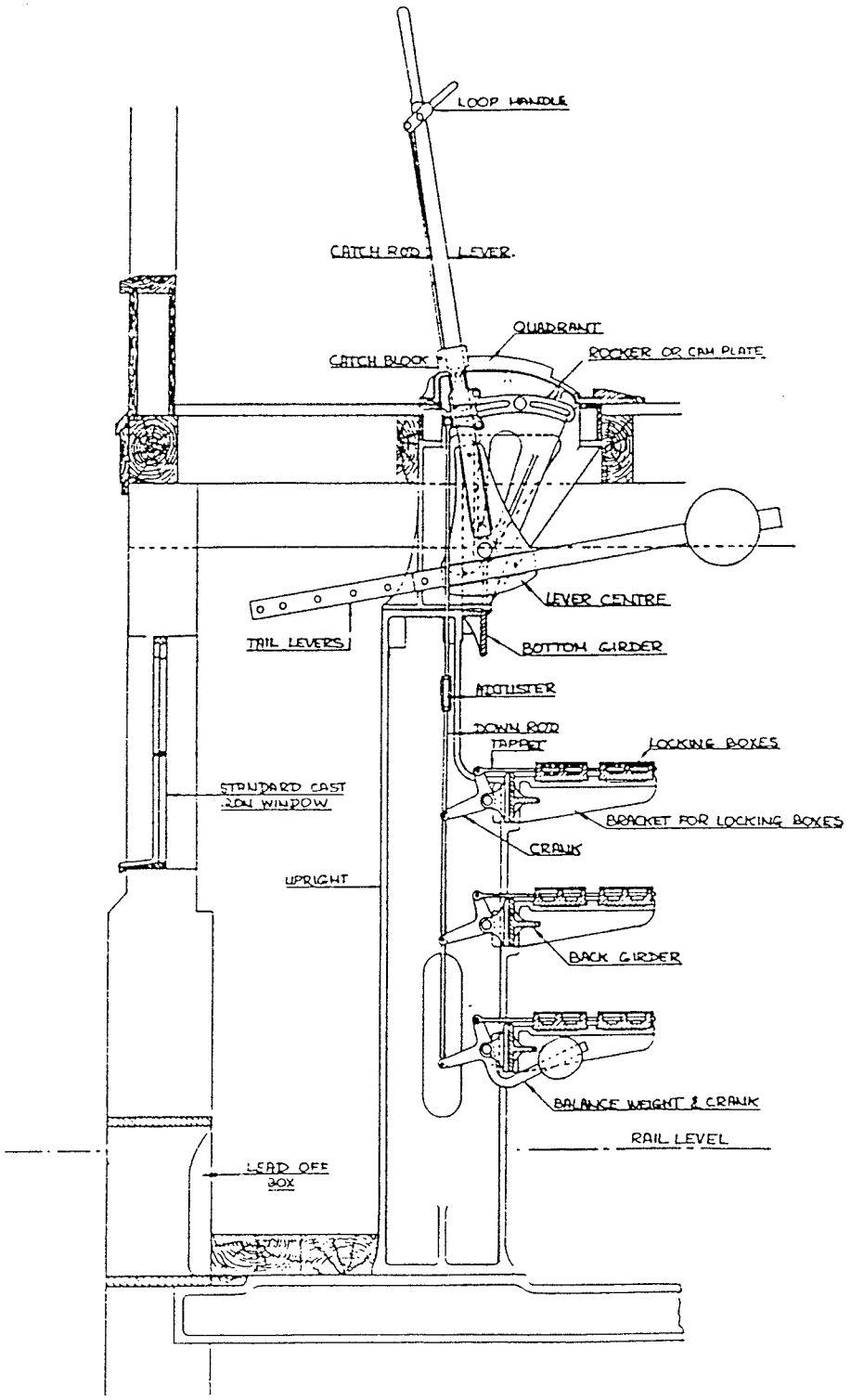
continued

Figure 4C.



continued

L.N.W.R TAPPET FRAME 5 1/2" CENTRES



"CATCH HANDLE" ACTUATED LOCKING

continued

Typical locking figures taken from the locking frame shown in Figure 5:-

6 LOCKS 7 BOTHWAYS.

(10 WITH 7 REVERSE) (12 WITH 7 NORMAL).

15 RELEASED BY (16 OR 17 OR 18).

9 RELEASED BY (13 WITH 14 REVERSE).

13 RELEASED BY 14.

continued

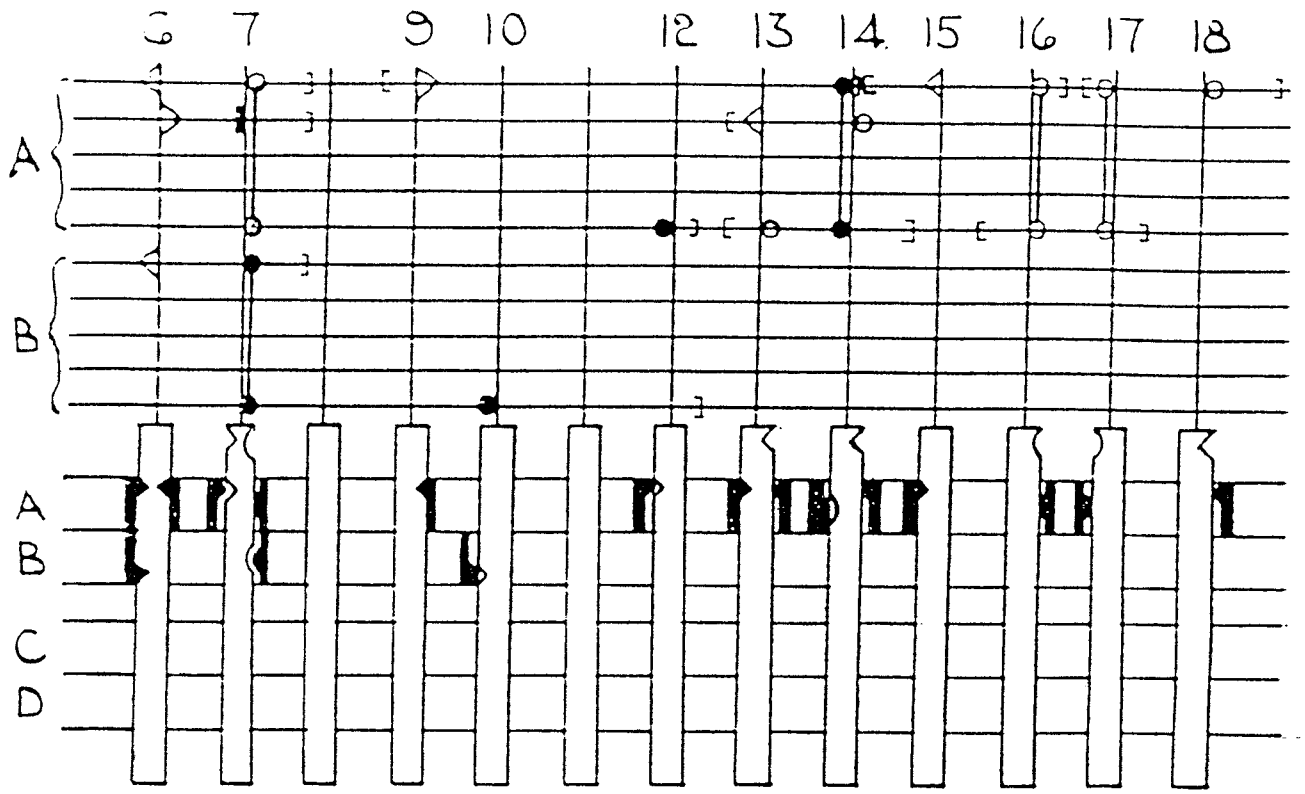


Figure 5.

LEGEND

- ● DENOTES NORMAL LOCK
- ○ DENOTES RELEASE LOCK
- ▮ DENOTES BOTH WAYS LOCK
- ▷ DENOTES ACTUATING LOCK PLUS DIRECTION OF MOVEMENT)

end

MODULE 16 - MECHANICAL INTERLOCKING.

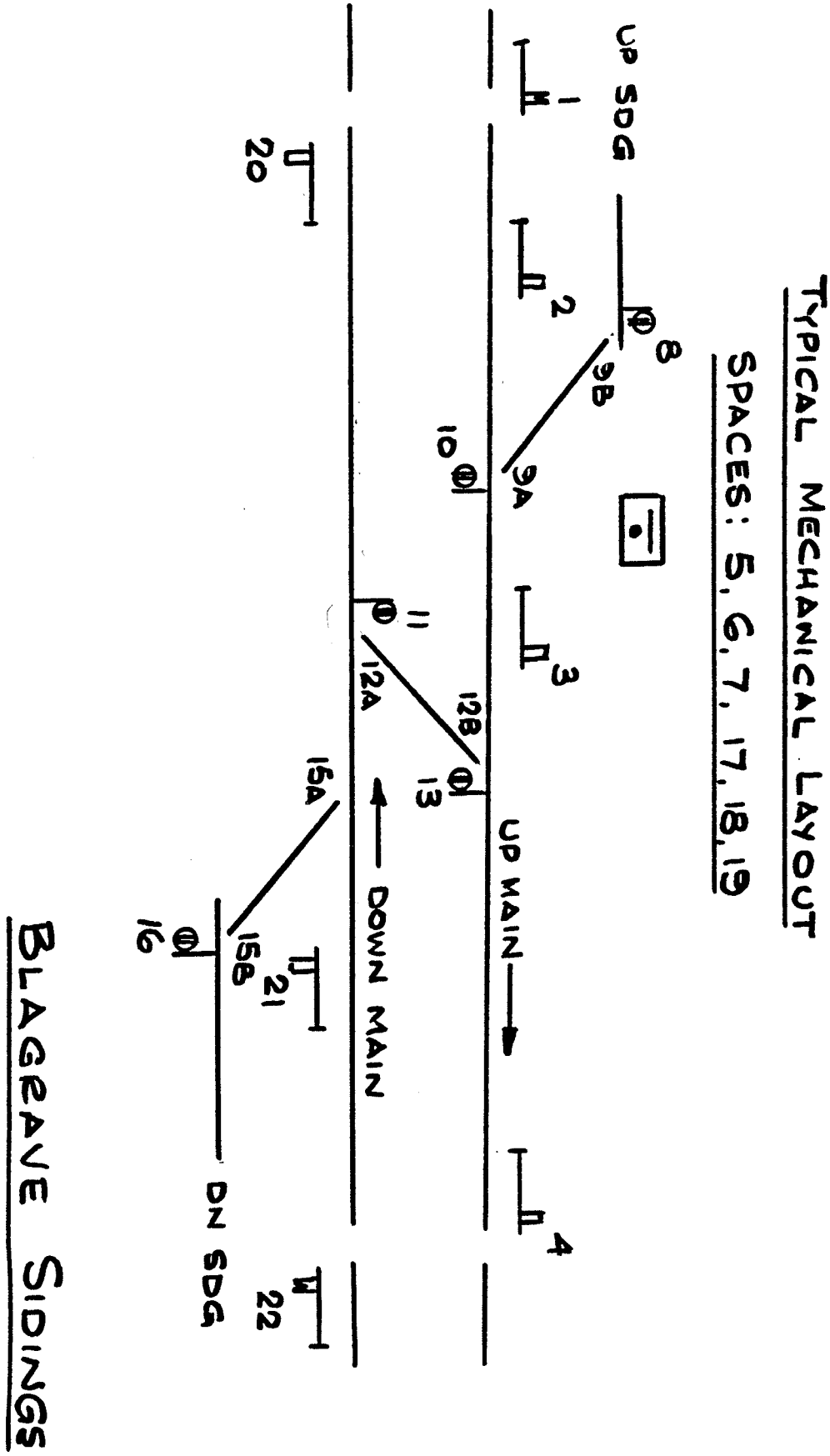
BRIEF HISTORY OF THE LOCKING FRAME ON THE GWR.

The first lever frames on the GWR came into being in the early 1860s & were generally manufactured by the firms of McKenzie & Holland or Saxbys, see BRIEF HISTORY OF RAILWAY SIGNALLING, Saxbys figured in the early interlocking frames throughout the Railway system.
Because of cost the GWR decided to build their own Locking Frames.The first locally made 16 lever locking frame was produced at the Reading Works,the design being by T. Blackall the GWR Telegraph Superintendent, this frame was installed on the departure side of Paddington Station in 1863. After this Reading built frames were installed at a wide range of places including Much Wenlock, Thingley Jcn & Honeybourne. During this period the GWR was short of finance & the spread of Locking Frames was generally slow.
In 1872, a fitting foreman at Reading, Tom Gooderson, invented his Twist Locking, the first really practical locking. At this time there was a resurgence in the GWRs financial state & a full scale programme of building these type of Twist Frames went ahead. This type of Locking Frame, & variations of it, were in use on the Ex GWR up until the early 1980s.
One of the disadvantages of Twist Locking was the space it took up, therefore in 1910 the " Cam & Tappet type" Locking Frames were introduced & from whence the various Locking Frames we have today get their names, such as GWR 5 bar vertical tappet or GWR 3 bar Horizontal tappet, examples of which can still be seen in the Mechanical Signal Boxes that still exist today in areas such as Cornwall & West Wales.

MODULE 16 - MECHANICAL INTERLOCKING - LEVER LEADS

1	2	3	4	10	11	12	15
UP	UP	UP	UP	DISC	DISC	MAIN	DOWN
MAIN	MAIN	MAIN	MAIN	FOR	AT	CROSSOVER	MAIN
DISTANT	HOME	STARTING	ADVANCED	9	12		DOWN
2			STARTING	9	12		SDG
3					OR		
4					15		

22	21	20	9	16
DOWN	DOWN	DOWN	UP	DISC
MAIN	MAIN	MAIN	MAIN	FOR
DISTANT	HOME	STARTING	UP	15
21			SIDING	15
20				


TYPICAL MECHANICAL LAYOUT
SPACES: 5, 6, 7, 17, 18, 19
BLAGRAVE SIDINGS
UP SDG
DN SDG
UP MAIN
DOWN MAIN
1
2
3
4
8
9A
9B
10
11
12A
12B
13
15A
15B
16
20
21
22

SESSION PLAN

MODULE 16 - MECHANICAL INTERLOCKING.

LOCKING TABLE FOR BLAGRAVE SIDINGS

NO	RELEASED BY	LOCKS NORMAL	LOCKS BOTHWAYS	RELEASES
1	2.3.4			
2	(3 MSL)	9.12.13		1
3	(4 MSL)	10.12.13	9	1
4		13	12	1
5	SPACE			
6	SPACE			
7	SPACE			
8	9	10.13		
9		2.12		8.10
10	9	3.8		
11	(12 or 15)	(13W12R).16.20		
12		2.3.9.15.21		(11)
13		2.3.4.8.(11W12R)	9.12	
14	SPACE			
15		12.21		(11) 16
16	15	11		
17	SPACE			
18	SPACE			
19	SPACE			
20		11	12.15	22
21	(20 MSL)	12.15		22
22	20.21			

1,3,13.

LEVER COLOURS

The instruction describes the format to be adopted for the presentation of lever painting details in accordance with the BRB Signalling Design Handbook Section E11 No.2.

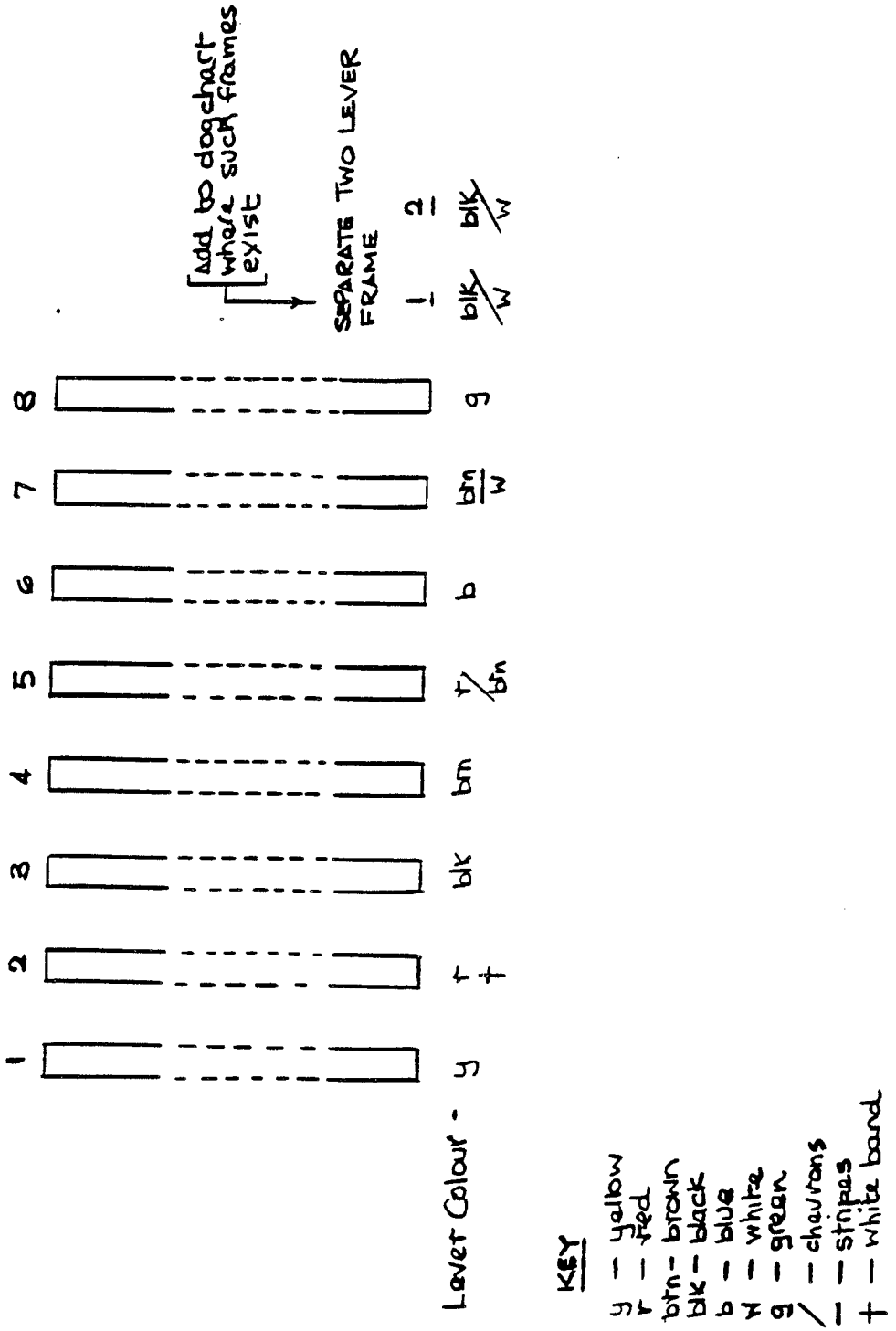
In future when a locking alteration is to be carried out at a mechanical signal box (irrespective of a lever colour change or not) a chart shall be produced recording all the lever colours therein and added to the dogchart -/6 (see Appendix 'A').

Where no dogchart exists for example a small two lever ground frame then an appropriate tabulation shall be made on the locking table (usually shown on the signalling plan).

The colours should be in accordance with BR10 "Painting Schedule - Signal Boxes and Signal Department Equipment" an extract of which is shown in Appendix 'B'.

LEVER COLOURS - APPENDIX 'A'

METHOD TO BE ADOPTED TO SHOW LEVER COLOURS ON DOGCHART (-/6)



LEVER COLOURS - APPENDIX 'B'

EXTRACT OF BR10 PAINTING SCHEDULE.

SIGNAL BOXES AND SIGNAL EQUIPMENT

PAINTING SCHEDULE

NEW WORK

DETAIL OR TYPE OF SURFACE TO BE PAINTED	SURFACE TREATMENT AND METHOD	MATERIAL B.R. SPECIFICATION AND ITEM			REMARKS
		PRIMER	UNDERCOAT	FINISHING	
Levers Distant Signal	Clean Down	2 Hr overcoatable Primer. 70/7	White Undercoating Paint 71/30	Yellow Finishing Paint. No. 356 71/96	Any lever which is released from another Signal box, e.g. Clear release or underbolt to have a (75 mm) 3" horizontal white band half way down lever. In cases of levers painted in alternate stripes, these to commence black or brown at the quadrant end of lever. In cases where a lever controls two functions e.g. F.P. Lock working with points or intermediate block home and distant signals both colours to be used. The colour used on the top half of lever to represent that apparatus moving first.
Stop Signal, ground signal, Route lever (controlling route indicator).	Clean Down	2 Hr overcoatable primer, 70/7	White Undercoating Paint. 71/30	Red Finishing Paint No. 537 71/91	
F.P. Locks, Clearance Bar, Economic Points	Clean Down	2 Hr overcoatable primer, 70/7	Grey Primer Undercoating 71/6	Blue Finishing Paint No. 166 71/93	
Points, Scotches, Derailers	Clean Down	2 Hr overcoatable primer 70/7	Grey Primer Undercoating 71/6	Black Finishing Paint 71/102	
Barriers, Wicket gates, Gate stops or locks, bridge locks, Turntable locks.	Clean Down	2 Hr overcoatable primer 70/7	Grey Primer Undercoating 71/6	Brown Finishing Paint No. 411 71/108	
Gongs, Asking Levers	Clean Down	2 Hr overcoatable primer 70/7	Grey Primer Undercoating 71/6	Green Finishing Paint No. 221 71/109	
Lever Collars	Clean Down	2 Hr overcoatable primer 70/7	White Undercoating Paint 71/30	Red Finishing Paint No. 537 71/91	Alternative finishing colours and lettering to be specified in accordance with local requirements.

LEVER COLOURS - APPENDIX 'B'

EXTRACT OF BR10 PAINTING SCHEDULE.

SIGNAL BOXES AND SIGNAL EQUIPMENT
PAINTING SCHEDULE
NEW WORK

DETAIL OR TYPE OF SURFACE TO BE PAINTED	SURFACE TREATMENT AND METHOD	MATERIAL B.R. SPECIFICATION AND ITEM			REMARKS
		PRIMER	UNDERCOAT	FINISHING	
Levers Release Lever, Switch Lever, Annetts Key Levers, Bolt Locking Lever.	Clean Down	2 Hr overcoatable Primer. 70/7	Grey Primer Undercoating 71/6	Top half Blue Finishing Paint No. 166 71/93 Bottom half Brown Finishing Paint No. 411 71/108	See remarks page
Acceptance Levers	Clean Down	2 Hr overcoatable Primer. 70/7	White Undercoating Paint 71/30	Top half Red finishing Paint No. 537 71/91 Bottom Half. Brown finishing Paint No. 411 71/108	
King Levers	Clean Down	2 Hr overcoatable Primer. 70/7	White Undercoating Paint 71/30	Alternate 75mm (3") horizontal brown and white stripe Brown Finishing Paint No. 411 71/108 White Finishing Paint 71/101	

LEVER COLOURS - APPENDIX 'B'

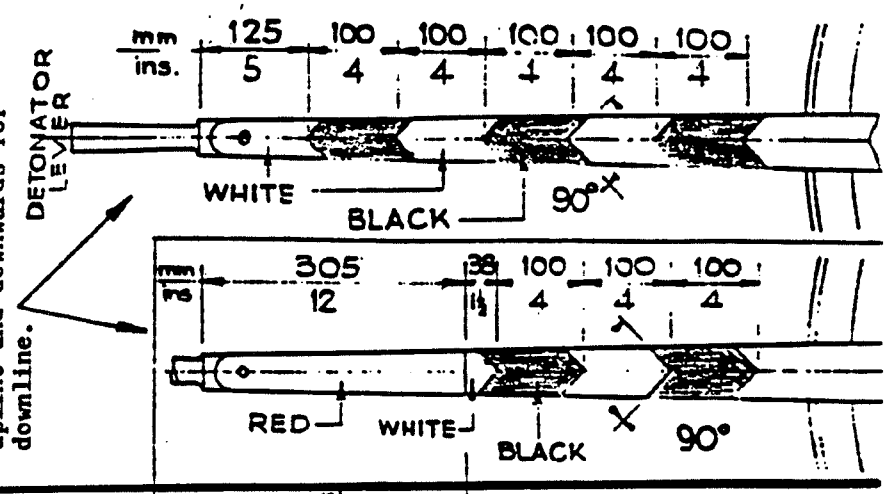
EXTRACT OF BR10 PAINTING SCHEDULES

SIGNAL BOXES AND SIGNAL EQUIPMENT

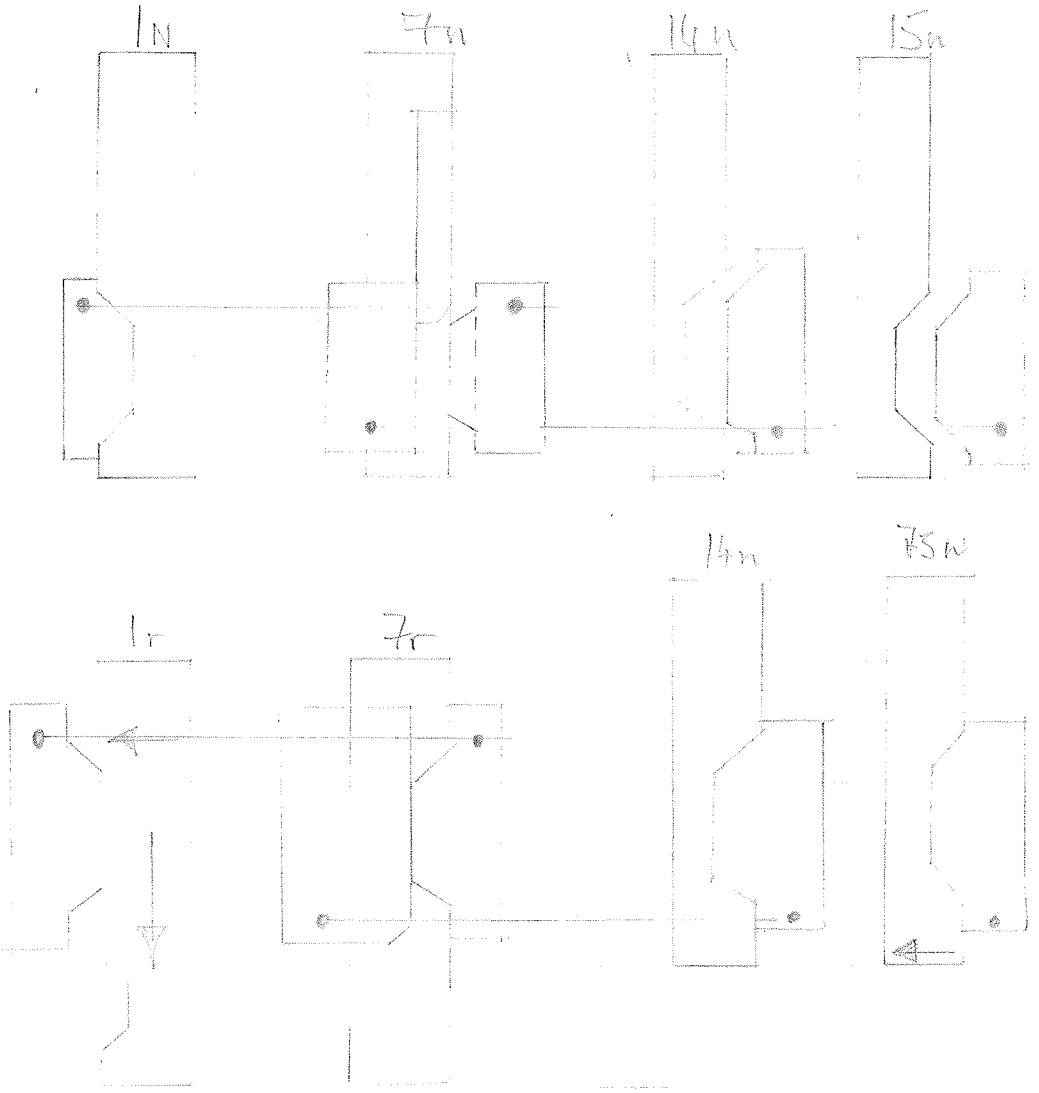
PAINTING SCHEDULE

NEW WORK

DETAIL OR TYPE OF SURFACE TO BE PAINTED	SURFACE TREATMENT AND METHOD	MATERIAL B.R. SPECIFICATION AND ITEM			REMARKS
		PRIMER	UNDERCOAT	FINISHING	
Levers Detonators	Clean Down	2 Hr overcoatable Primer. 70/7	White Undercoating Paint. 71/30	Alternate Black and White 100mm Chevrons, Black Finishing Paint. 71/102 White Finishing Paint 71/101	Chevrons to point upwards for upline and downwards for downline.
Signals working with detonator placers.	Clean Down	2 Hr overcoatable Primer. 70/7	White Undercoating Paint. 71/30	Top half, Red Finishing Paint No. 537. Bottom half alternate Black and White 100mm (4") chevrons Black finishing paint 71/102 White finishing paint 71/101	
Spare Levers	Clean Down	2 Hr overcoatable Primer. 70/7	White Undercoating Paint. 71/30	White Finishing Paint. 71/101	



1 Lock (14 . 15N 7R).
1 Locks (14 N 15N 7R) -



(22)

22
Down Main
Distant

21
Down main
Home

20
Down main.
STARTING

9
UP MAIN
~~DS~~
UP SDG

~~16~~
~~DN SDG~~

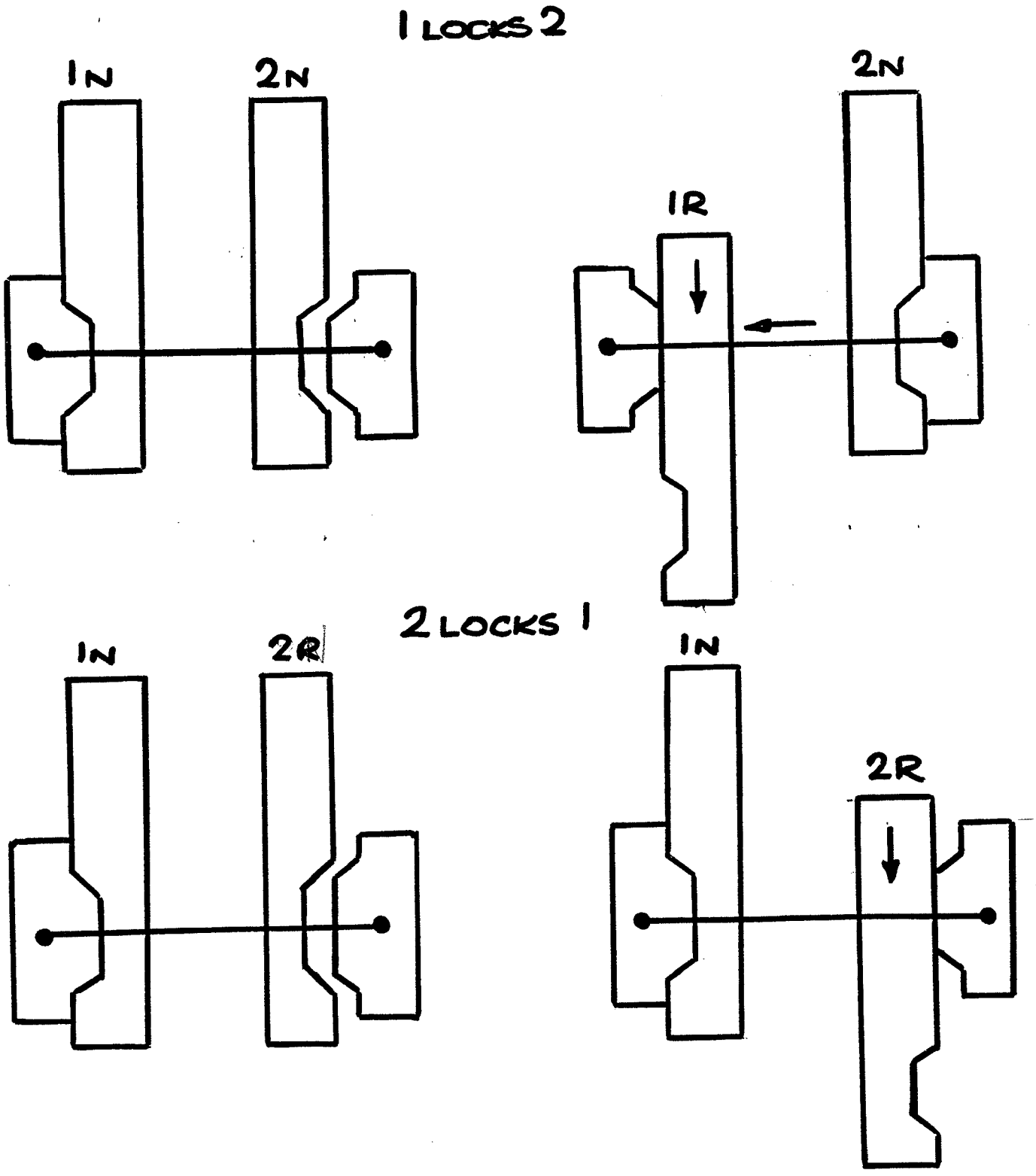
20
21

16
Disc
for
15
15.

SE. ION PLAN

MECHANICAL INTERLOCKING.

Ex GWR

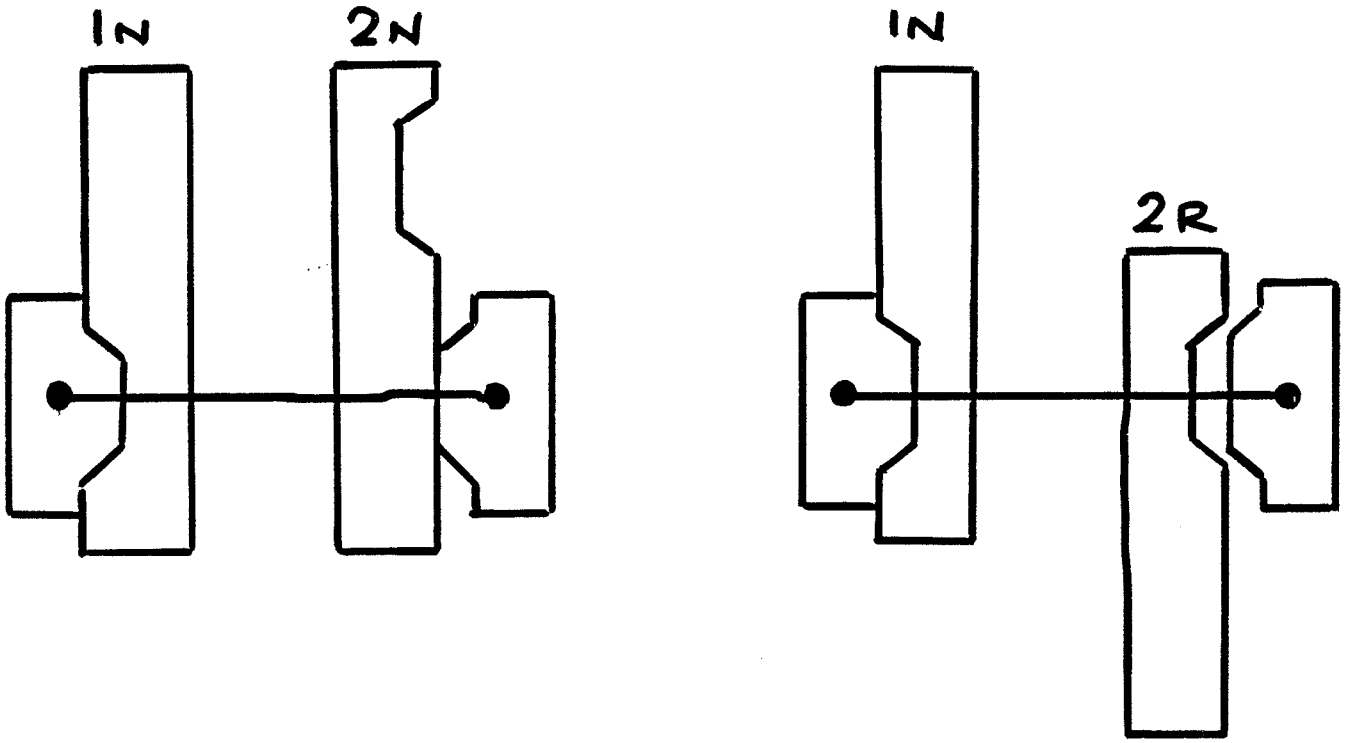


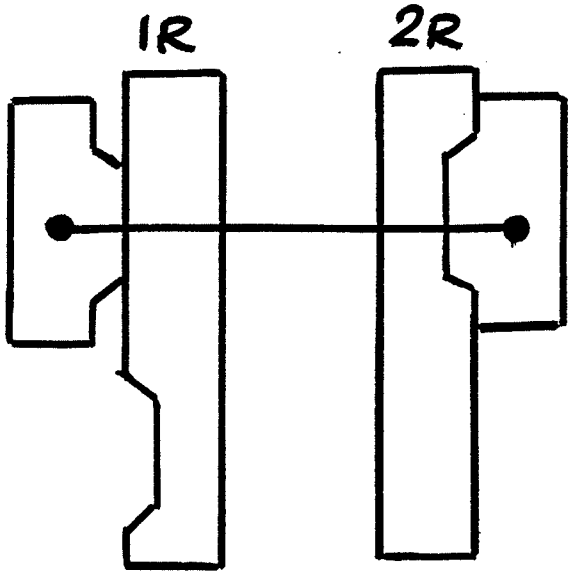
SE ION PLAN

MECHANICAL INTERLOCKING.

Ex GWR

1 RELEASED By 2



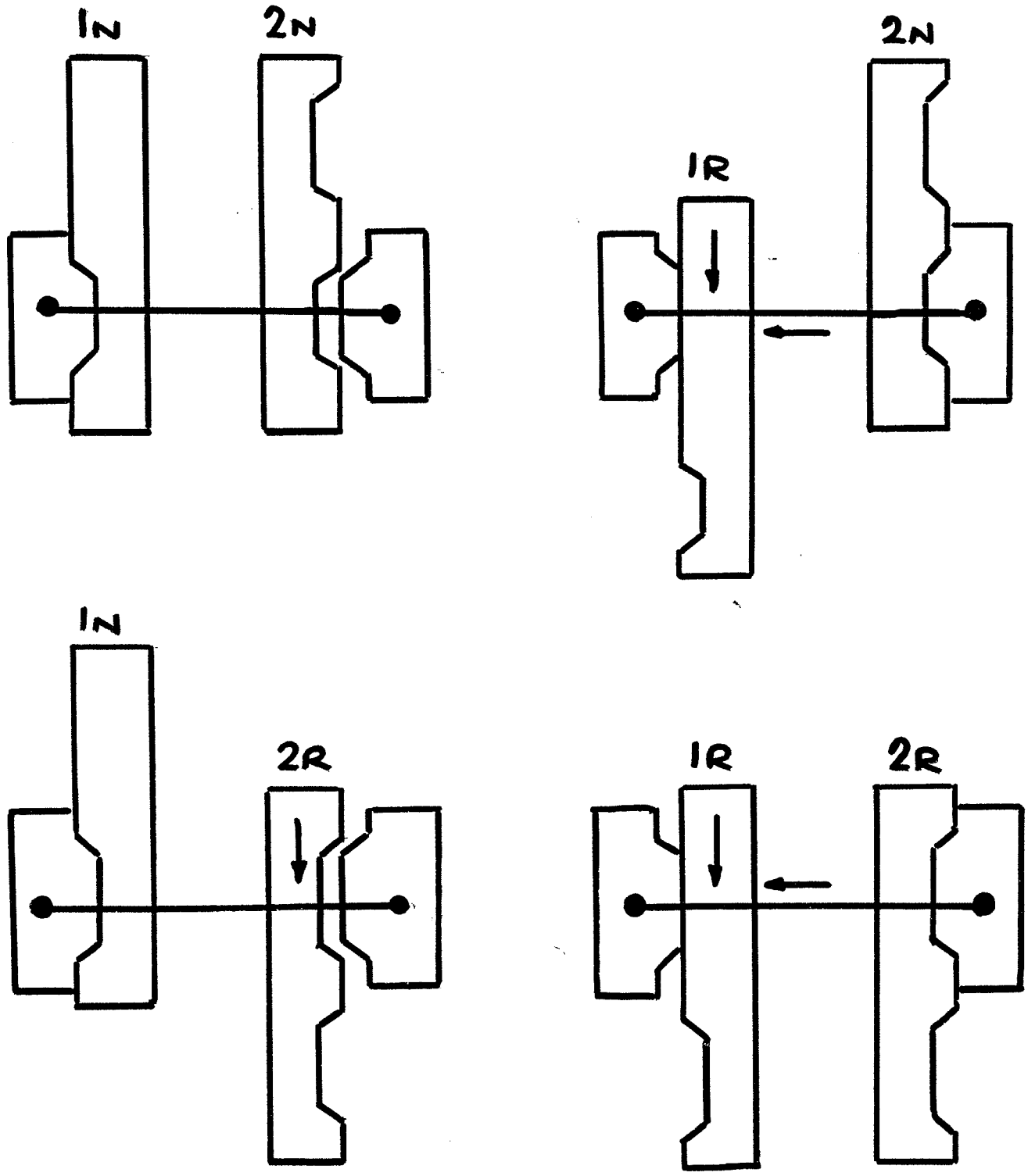


Si SION PLAN

MECHANICAL INTERLOCKING.

Ex GWR

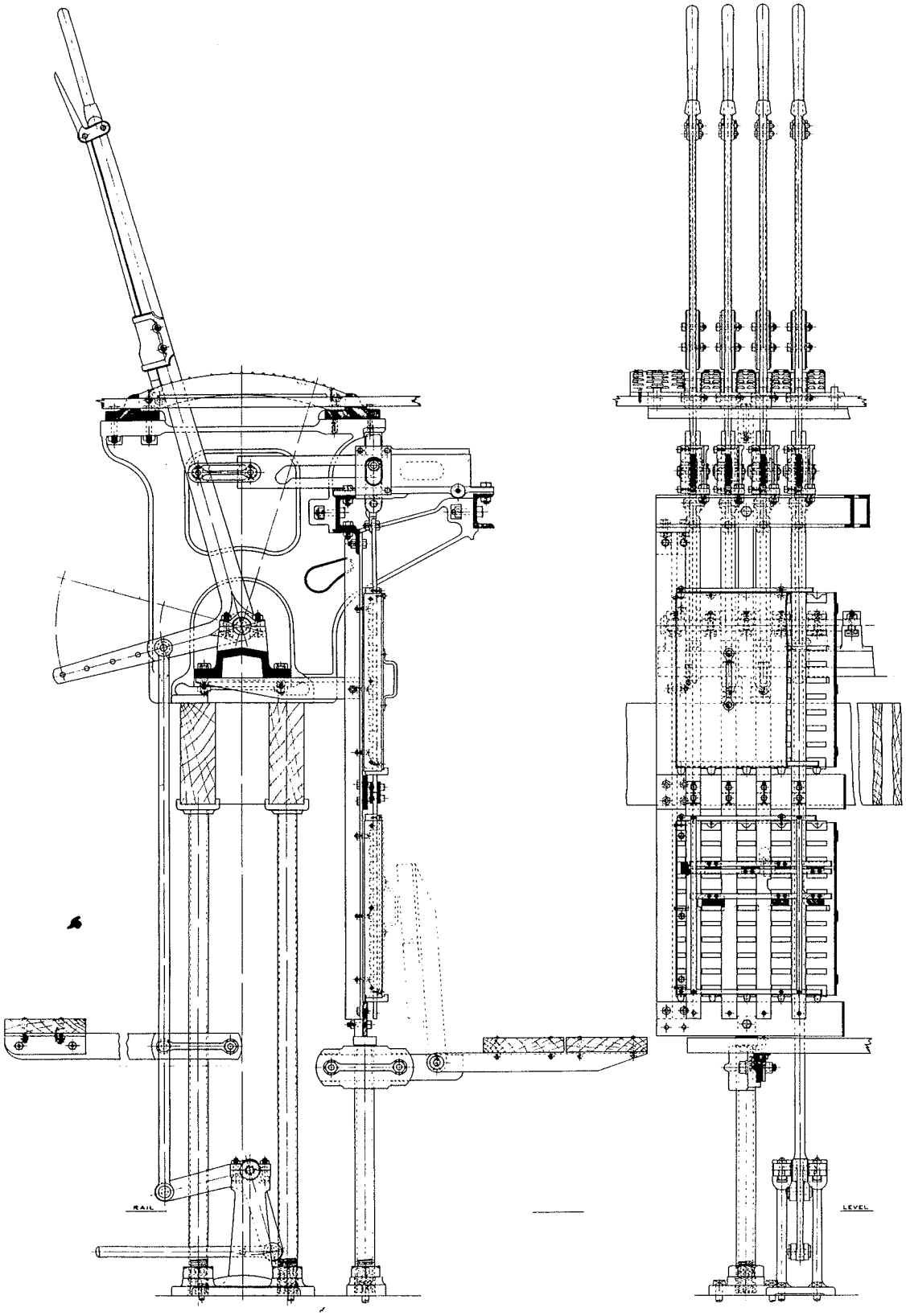
1 LOCKS 2 BOTHWAYS



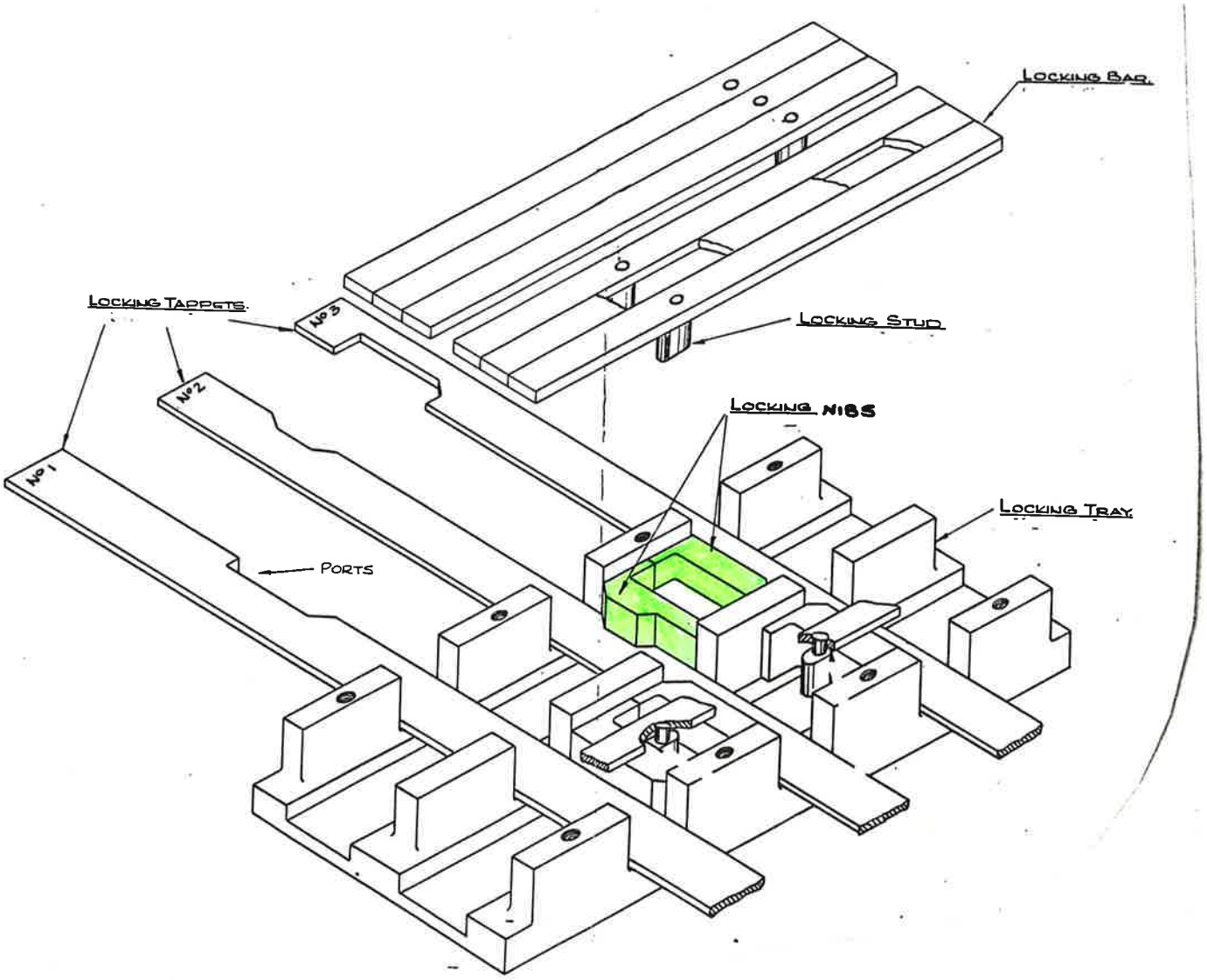
SESSION PLAN

MLKG/PB

MECHANICAL INTERLOCKING.



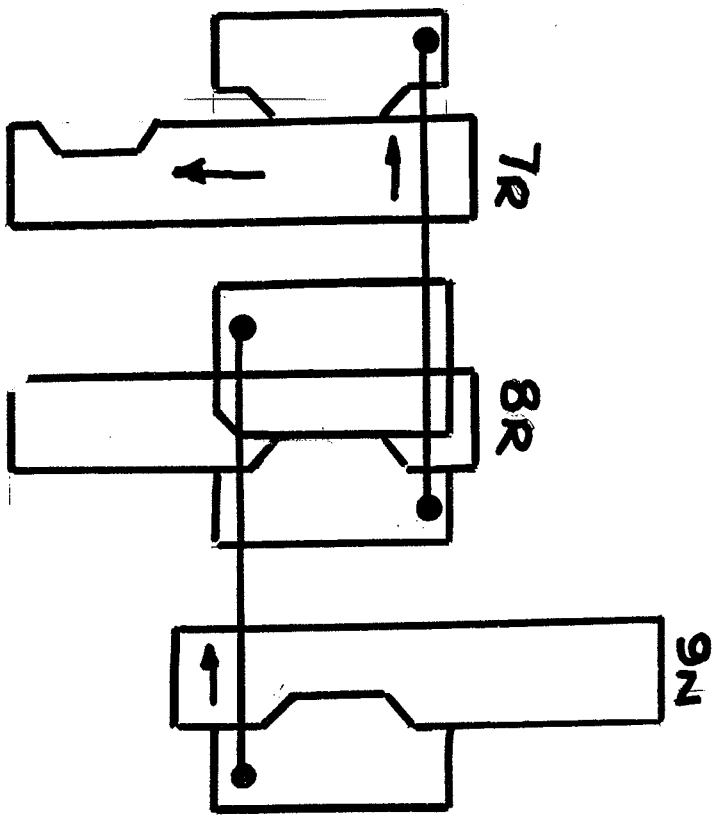
MECHANICAL INTERLOCKING.

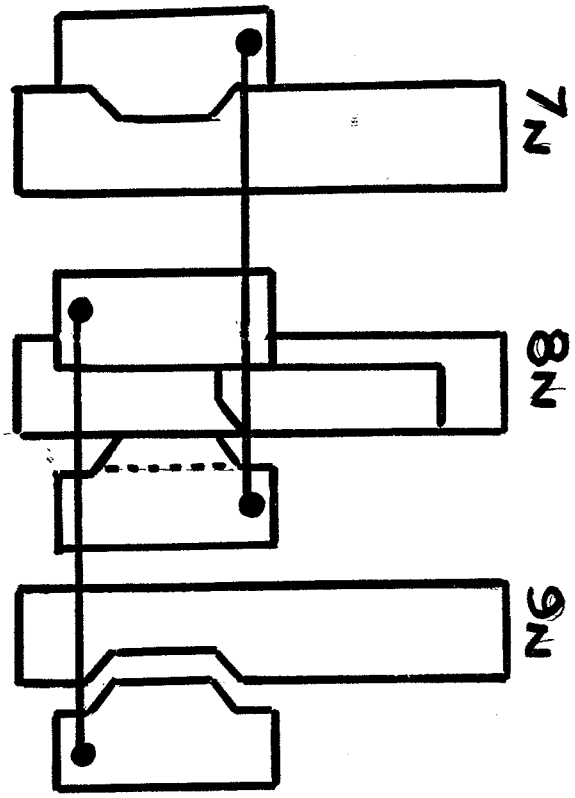


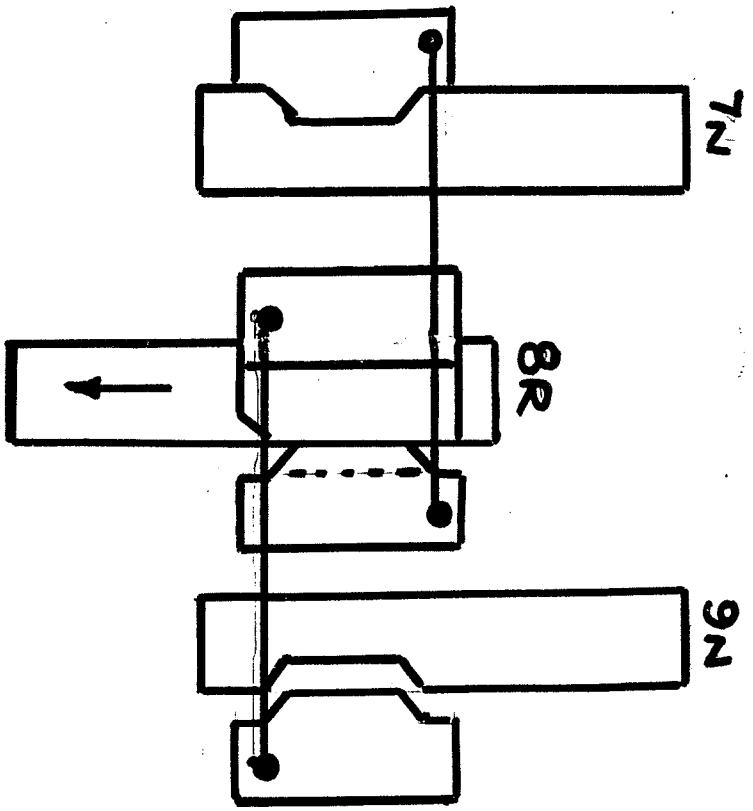
TYPICAL EX GWR LOCKING LAYOUT

MECHANICAL INTERLOCKING.

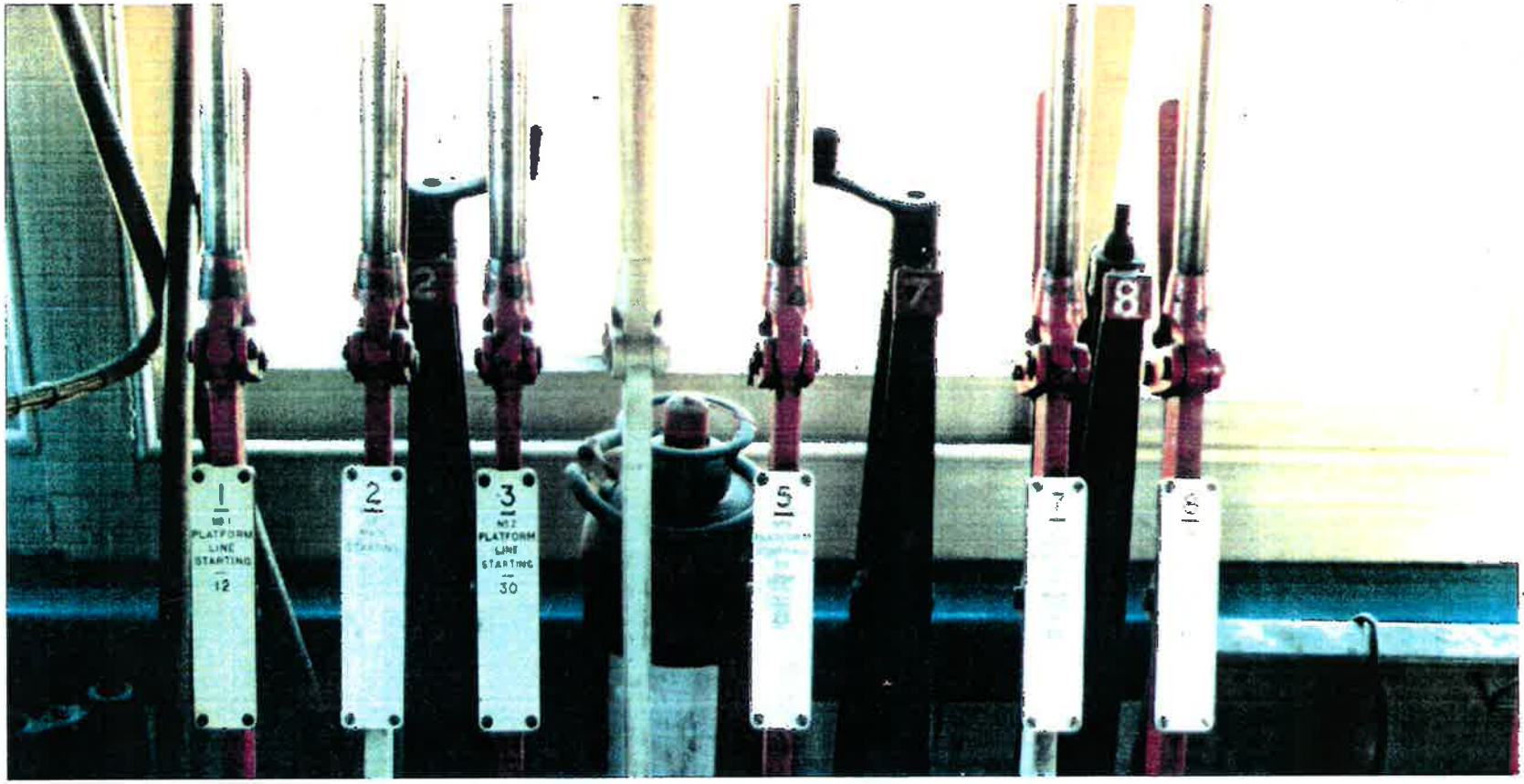
Ex GWR

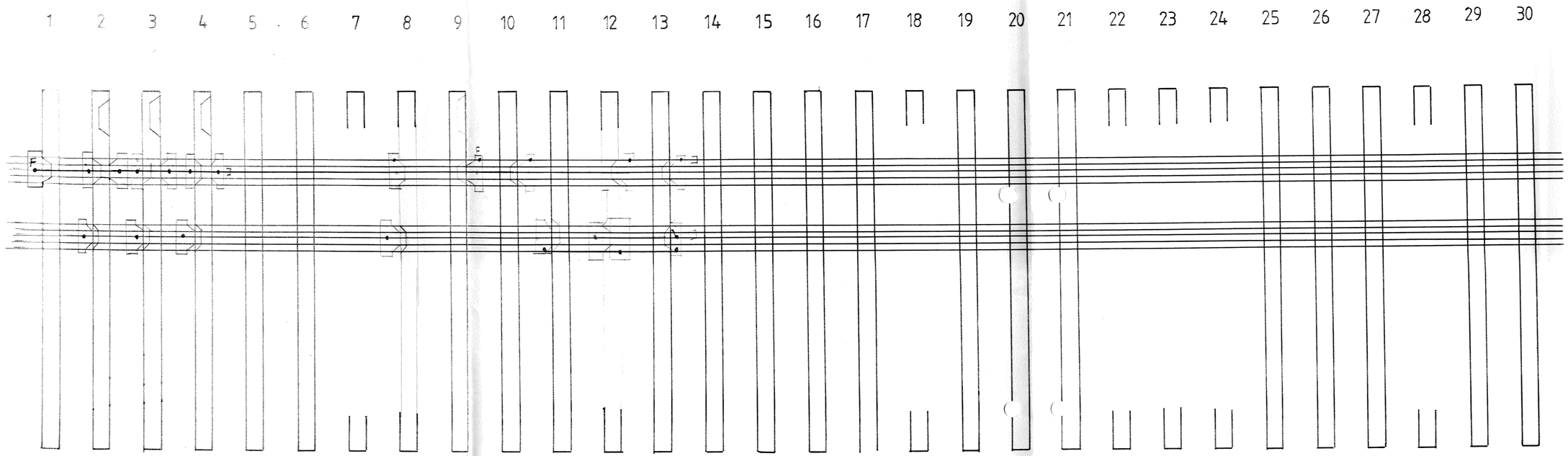






7 LOCKS 9 WHEN 8 REVERSE


1
PLATFORM
LINE
STARTING
12
2
3
PLATFORM
LINE
STARTING
30
5
7
8



Activity	Initial	Date	Remarks
Equip't type/profile			
Wire count			
Continuity test			
Strap and function			
Cable cores			
External equip't			
Timers set and sealed			

Drg. No.			
Produced			
Checked			
Scale			
Issued			

British Rail

Sht. No.

A1