MÄRKLIN

Model Signals

Illustrated handbook

446

446/99 E

Where to place the signals

The signals of the 445 series can be installed anywhere on the layout, **on straight as well as on curved track sections.** By pressing the track down into the base plates a secure connection is established. Those fans having permanent layouts and wishing to fasten the signals to the board can do so by removing the cover plate. They will then find the two holes through which the wood screws are to be placed. Those modelling a prototype railroad using left-hand traffic can also install the signals to the left of the track. Care should be taken that the base plate is inserted into the floor of the signal from the correct side (Fig.1a and 1b).

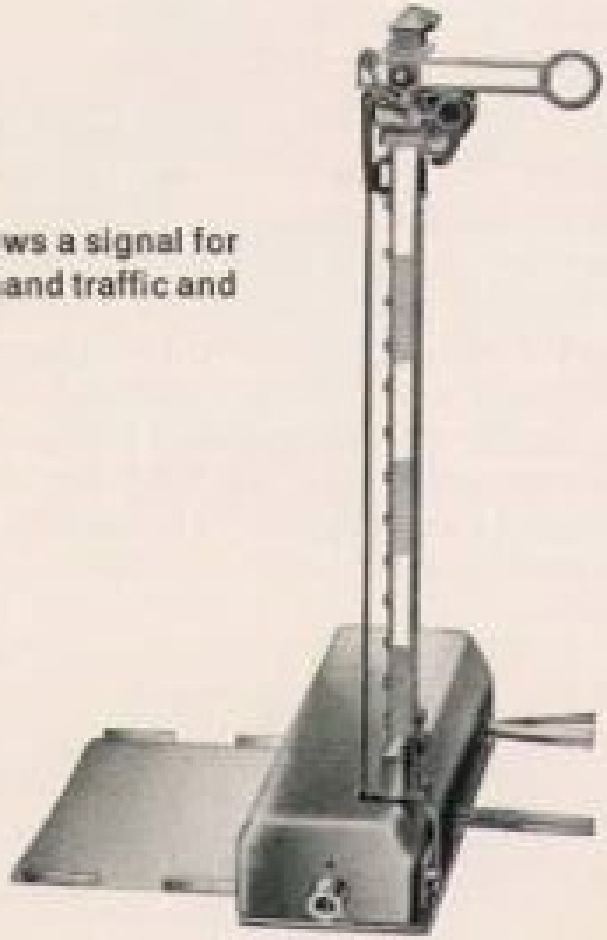


Fig. 1a Shows a signal for right-hand traffic and

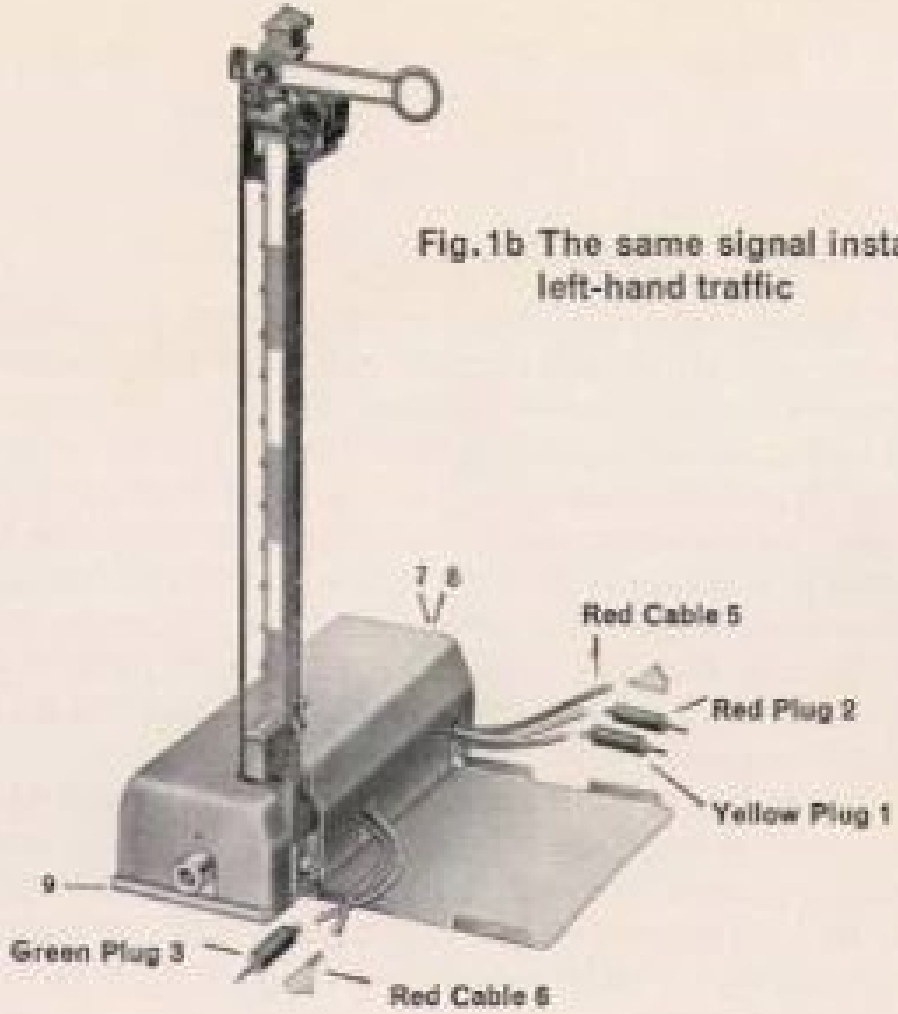


Fig. 1b The same signal installed for left-hand traffic

Cables and Sockets on the Signals

ll signals with train control there is a clear distinction
een the activating and the conducted operating current.
corresponding connections are illustrated for signal
1 in Fig. 1b, for signal 446/13 in Fig. 2a, and for signal
in Fig. 2b. All other signals are connected in a similar
ner. The activating current is brought to each signal
gh the yellow cable with the yellow plug (1) and creates
necessary magnetism in the solenoids. It leaves the
l through the blue cable with red plug (2), the blue
with green plug (3), or in some cases through the blue
with orange plug (4).
operating current, in the case of **center rail pick-up,**
nducted through the red cables (5 and 6), which have
ct tongues at their ends. These are connected with the
r rails of the track sections. The plugs from the signal
s, which are used for overhead pick-up, are inserted
sockets 7 and 8.
et (9) at the rear of the signals is used to lead the illumi-
nating current from the signal when the model track s
tions 3800 and 3900 are used.
The warning signals do not affect the movement of
trains. They therefore do not have connections (5), (6),
or (8). More details about the activating current and the c
ducted operating current for trains are given in
following chapters.

The Signal Activating Current

Connection to a control plate.
The semaphore arm has two positions and is moved fr
one position into the other through the movement of
core. The current flowing through the two solenoids de
mines the position of the core and therefore the semaph
arm. Fig. 3 on the next page illustrates the flow of the sig
activating current through these solenoids where the circ
is closed through a **control plate.** The connections for
conducted operating current are not shown in the illust
tion.

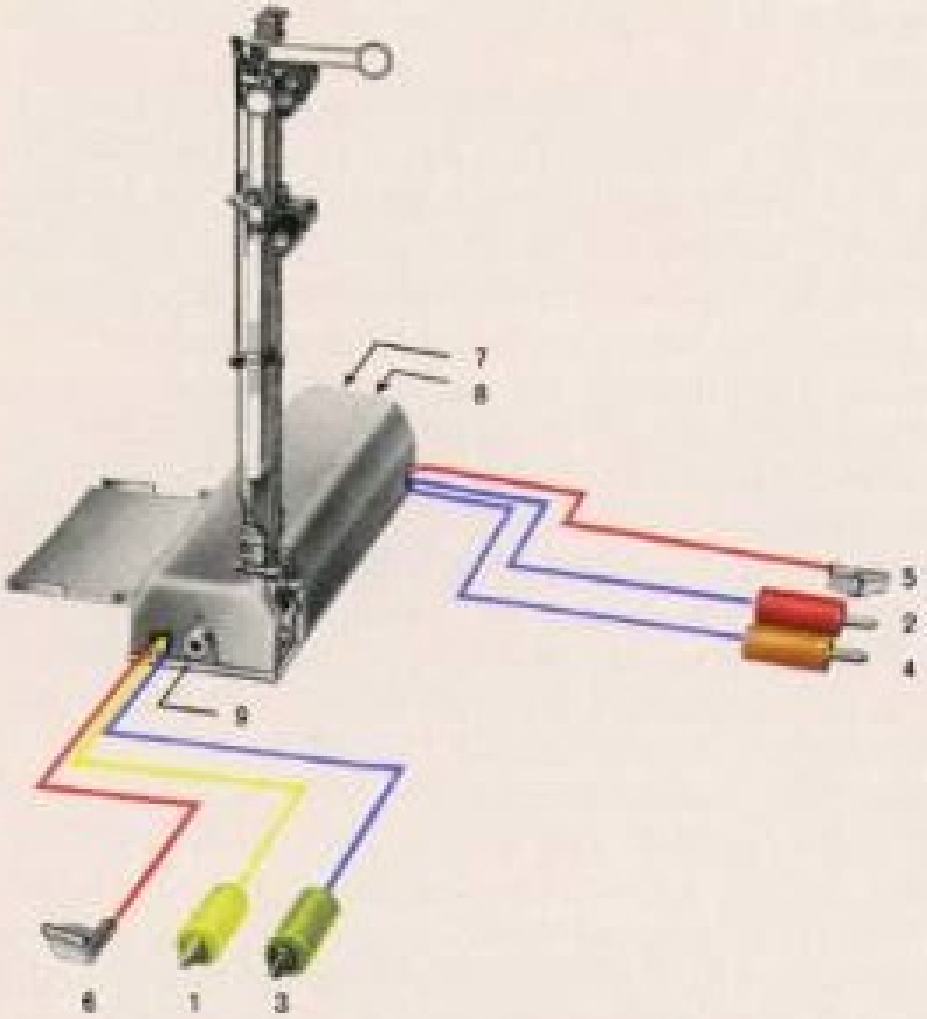


Fig. 2a The three-position semaphore 446/13 and its connections

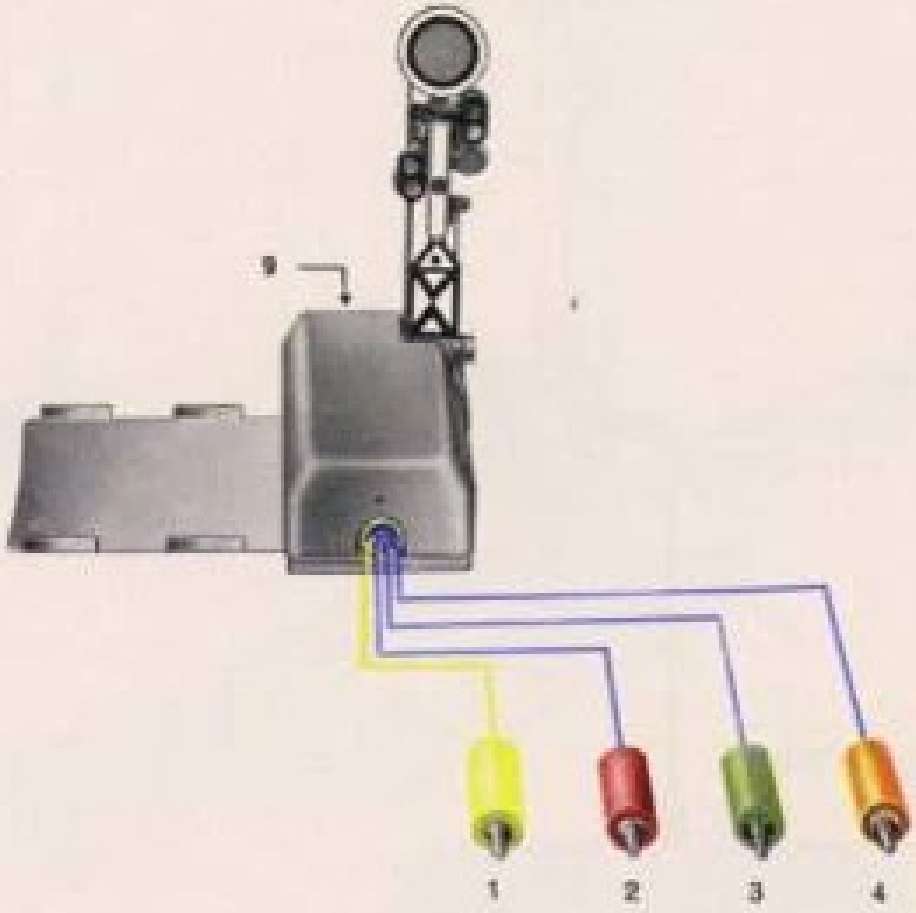
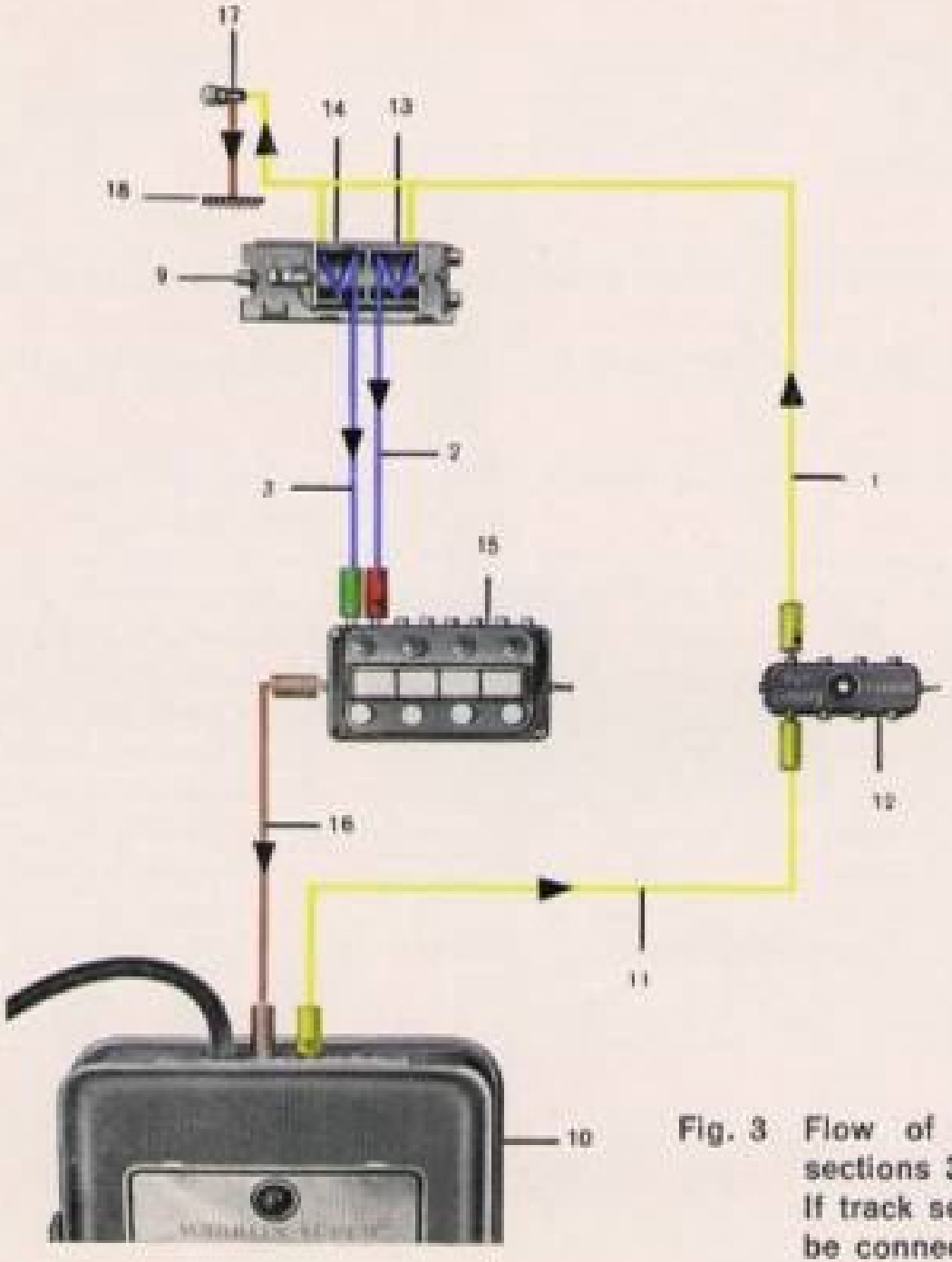


Fig. 2b Warning Signal 446/3 and its connections



The current flows from the yellow (Light) socket of the transformer (10) through a light cable (11), the distributor plate 470 (12), the signal's yellow cable (1) to the solenoids (13 and 14).

Return connection of the signal activating current.

Solenoid (13): through the signal's blue cable with **red** plug (2), control plate (15), ground cable (16), to the ground (brown) socket of the transformer (10). If the signals are activated by a shot of current through the blue cables with **red** plugs, they will come to the "**Stop**" position.

Solenoid (14): through the signal's blue cable with **green** plug (3), control plate (15), ground cable (16), to the ground (brown) socket of the transformer (10). If the signals are activated by a shot of current through the blue cables with the **green** plug, they will come to the "**Go**" position.

The two-position signals 446/12 and 446/2 are an exception. In the case of these signals, contact through the blue cables with **green** plug bring the signals respectively to the "**Slow**" or the "**Slow Signal Ahead**" position.

The two-arm, three position semaphore has a third solenoid with a core inside it. This solenoid is intended to move the second (lower) arm of the semaphore. The return current for this third solenoid flows through a blue cable with orange plug. The warning signal 446/3 has a similar cable. If the circuit is closed through this cable, the semaphore assumes the "**Slow**" position and the warning signal the "**Slow Signal Ahead**" position. The arm on the warning signal 446/3 is turned 45°.

Fig. 3 Flow of the signal activating and illumination current using track sections **3600** and **3700.**
If track sections **3800** or **3900** are used, socket (9) on the signal must be connected to the ground. (Also see Fig. 9 on page 5.)

The current for illuminating the signal flows through the yellow (1) cable to the bulb (17). The current returns to the transformer in two ways:

1. Using track sections 3600 and 3700 the current flows down the signal's mast to the base plate and from there to the roadbed which in turn is connected to the ground (brown) socket of the transformer. Naturally there must be a good electrical connection between the base plate and the roadbed.

2. Using track sections 3800 and 3900, the current cannot return in this manner because the roadbed of these sections is not grounded. In this case the socket at the rear of the signal (9) must be connected with the ground (brown) socket on the transformer. If there are several such connections to be made, a distributor plate 470 is best used. If a warning signal is placed immediately before a home signal, **one** ground cable can be used to ground both signals. In this case the ground sockets on the signals must be connected by an intermediate plug 490 Y (Fig. 4).

From the preceding it can be seen that the solenoids which set the signals' positions and the bulbs which light them are set for the same voltage.

Both are connected to the light current, which greatly simplifies the installation of the signals. Had we used a separate cable for the lights, the additional cable would have made the connections more confusing. The yellow cable, therefore, leads the current both to the solenoids and to the lights. Those who wish to be able to turn the lights on and off at will, however, need only separate the cable which runs up the mast from the solenoid, place the end outside the cover and add a yellow plug to it.

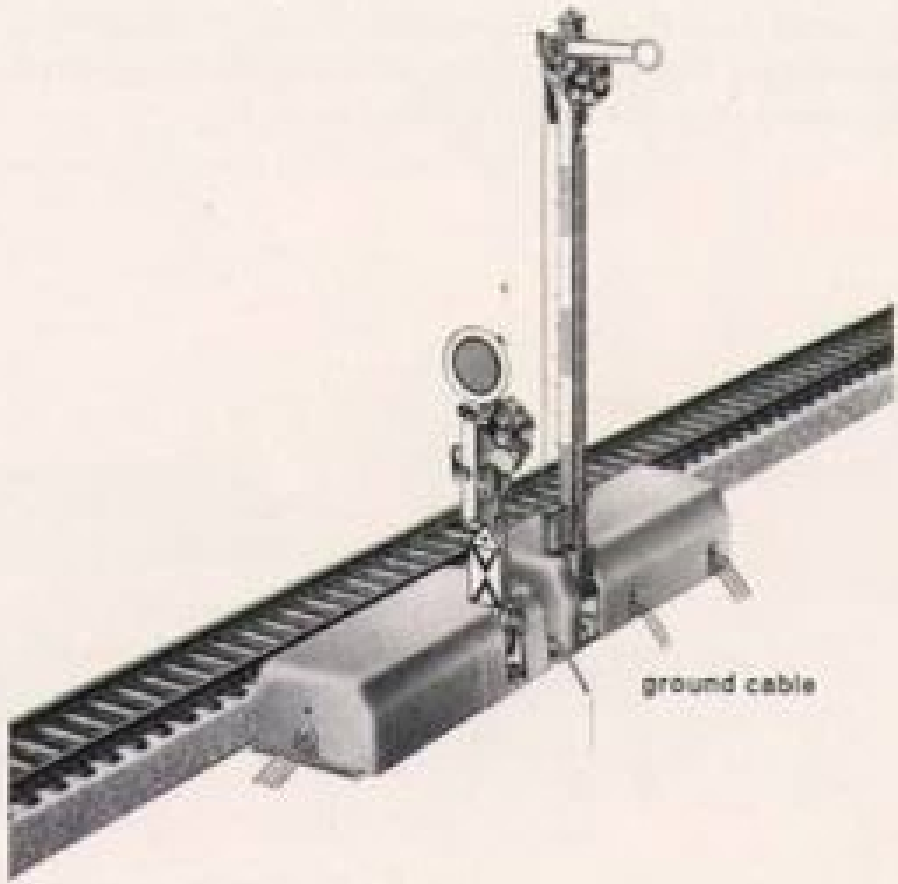


Fig. 4 Warning signal connected to home signal

Automatic Operation Through Contact Track Sections

If the trains themselves are to determine the positions of the signals, contact track sections BSD or BSA are used in place of the control plate. As can be seen in Fig. 5, these have a section on one of their outside rails which is insulated from the ground. This insulated section is connected with 2 sockets on the side of the roadbed. Into these sockets the red, green, or orange plugs on the blue cables should be inserted as needed. Since these sockets are insulated from the ground together with the aforementioned rail section, the flow of current is normally interrupted here. (Similarly as in the control plate.)

Should a train now pass over this contact track section, the wheels and axles create an electrical connection between the insulated and the uninsulated part of the track. This enables the current from the signal to flow back to the transformer through the wheels and axles and the roadbed. This activating current continues to flow until the last pair of wheels of the train has left the contact track section. To avoid overheating the solenoids, it is recommended to avoid installing the contact track sections in places where the train is normally stopped or parked.

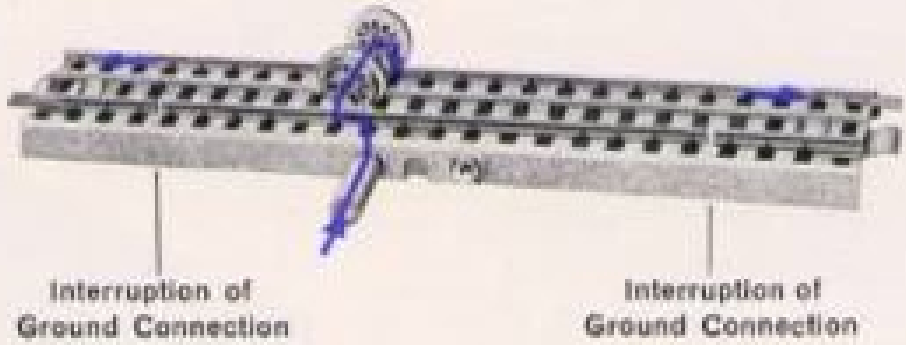


Fig. 5 Flow of the current when train passes over contact track section

Conducting the Operating Current

If it is intended to control the starting and stopping of the train by remote control, one can stop the locomotive in front of a closed block signal by turning off the power from the transformer. In such a case the red cables on the signals need not be connected.

If, however, the signal is expected to stop the train **automatically** from proceeding, it must be installed in such a manner that the train cannot pass the closed signal. This can be accomplished by installing in front of the signal a short stretch of track which receives no power when the signal is closed, but does receive power when the signal is opened. Built into the signal for this purpose is an

Operating Current Interruptor

which regulates the operating current with the aforementioned result. The construction of this interruptor is illustrated in Figs. 6a and 6b. It is coupled with the core (1) which moves the signal arm through an angle joint (2) and rods. (In the illustration the masts of the signals have been broken.) On both sides of the core there is a contact piece (3) for overhead and third rail interruption. On each of these contact pieces two contact tongues are sliding (visible in the illustration are contact tongues 4 and 5). The two red cables (6 and 7) which run out from the signal are soldered to the ends of the contact tongues. Fig. 6a shows the interruptor when the signal is open. Both contact tongues (4 and 5) are on the contact piece (3) so that the current flows from one tongue to the other. This enables the operating current to flow from one red cable (6) into the other (7) and thus pass through the signal (Signal in "Go" position). Fig. 6b, on the other hand, shows the signal in closed position. Here the core has been pulled back so that the upper silver contact tongue (5) has slid off the contact piece (3) and now rests on the core (1) which is made of insulating material. This prevents current from flowing from one red cable into the other and thus stops the train (Signal in "Stop" position).

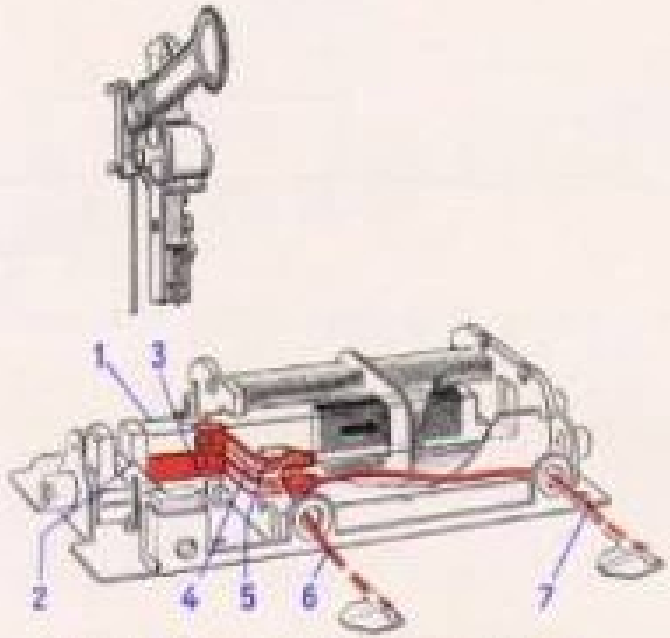


Fig. 6a Operating Current Interruptor in "Go" Position

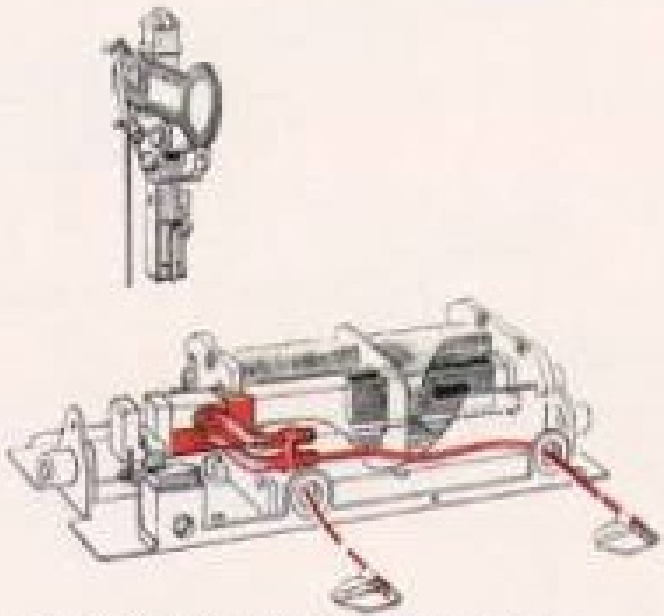


Fig. 6b Operating Current Interruptor in "Stop" Position

The installation of the signals for automatic train control follows the same principle for center rail and overhead operation. It is extremely simple if the following instructions are followed.

a) Center Rail

Fig. 7 shows the stretch of track in front of the signal which is electrically insulated from the remainder of the layout. This stretch normally consists of 4 sections of track. At the track connection closest to the signal (1), the third rail insulator 3600 Z should be inserted **between** the contact tongues. Point 2 is similarly insulated. The contacts at the ends of the red cables should be inserted **over** the contact tongues at points 3 and 4 (see also Fig. 8). Should the signal now be closed, the insulated stretch of track is **dead.** When the signal is opened, current flows through from contact 3 to contact 4 and hence supplies the insulated stretch with power.

It is recommended that points 1 and 2 (Fig. 7) be marked with the insulation marker 3600 J. The arrow which can be seen on these markers is also used by prototype railroads to indicate insulated sections.

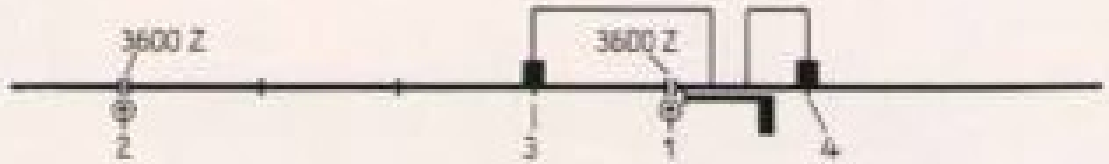


Fig. 7 Stretch of track with insulations at points 1 and 2 and installed contacts at points 3 and 4

b) Overhead Wire

For automatic train control of locomotives fed from the overhead wire, the overhead signal outfit 409 GS is required. The two overhead circuit breaker sections 409 U are installed over the places where the third rail interruptors were installed (points 1 and 2). One of the signal contact masts 409 MS is then placed inside the insulated stretch of track and the other one to the rear of the signal outside the insulated stretch. The plugs on the red cables are then inserted into the 2 sockets at the rear of the solenoid box (Sockets 7 and 8 in Fig. 1b and 2a).

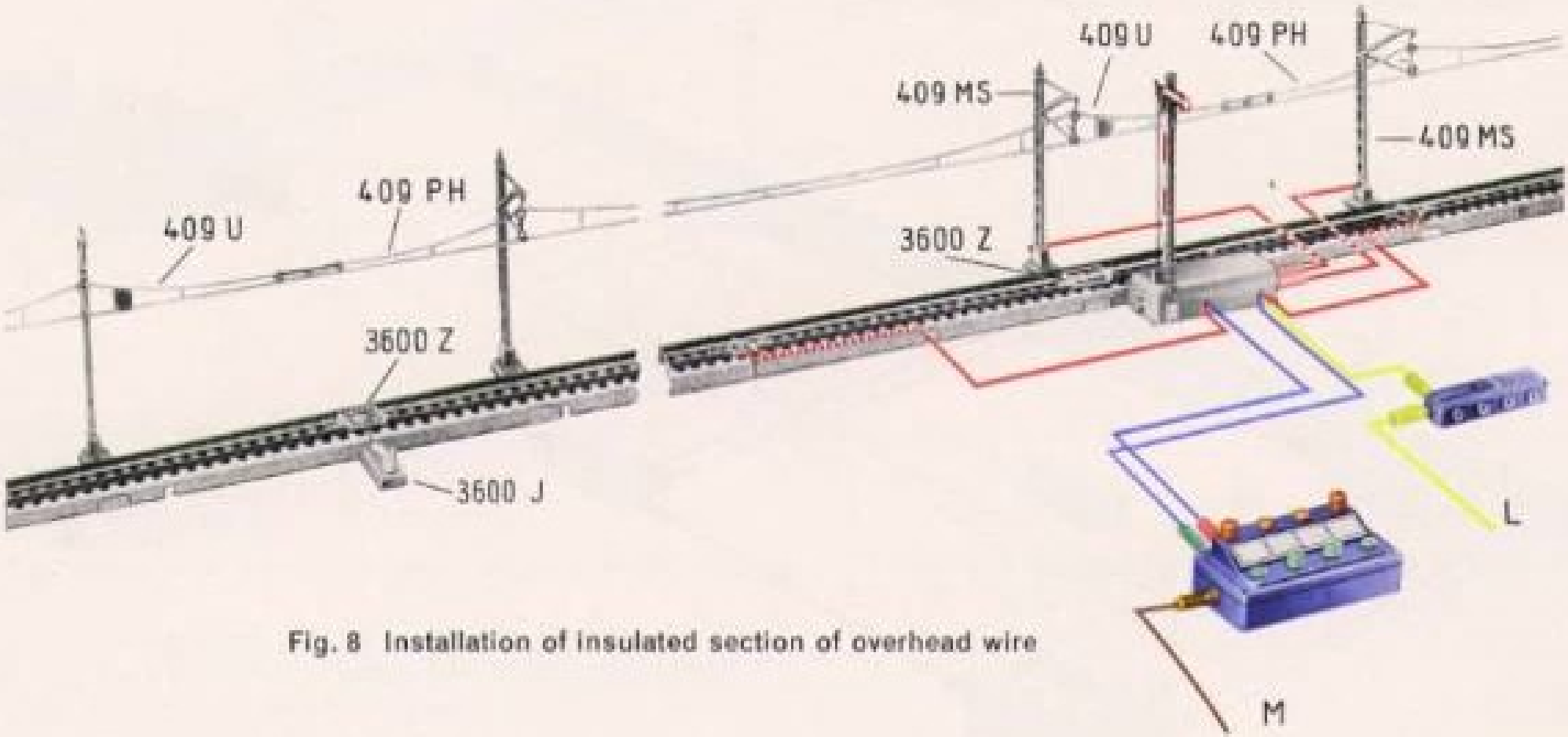
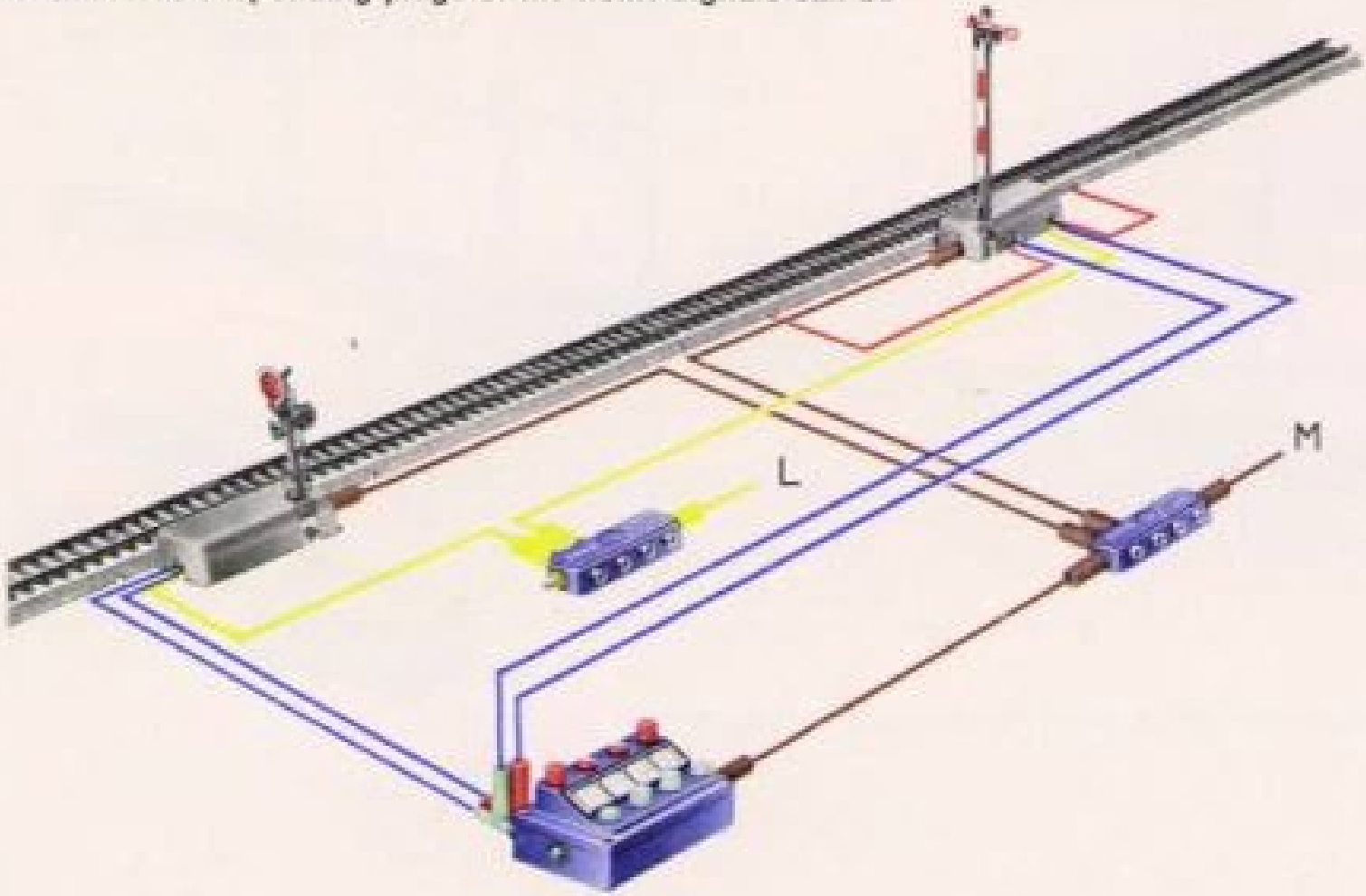


Fig. 8 Installation of insulated section of overhead wire

Connection of the warning signals with the home signals

On prototype railroads warning signals are installed a certain distance in front of home signals so that the engineer will know in what position he may expect to find the home signal. These warning signals therefore are always set at the same time as the home signals and in the corresponding positions. Most fans will want to duplicate this feature on their layouts. For this purpose the red and green plugs on the blue cables of the warning signals have sockets into which the corresponding plugs of the home signals can be inserted (Fig. 9). The orange plugs on the three-positional signals can be similarly used. If the signals are automatically operated through the use of contact track sections, the two plugs may also be inserted into the contact track section separately, side by side. Fig. 10 shows the connection of a warning signal and a home signal to a contact track section; the signals are brought to the "stop" position when a train moves over this track.



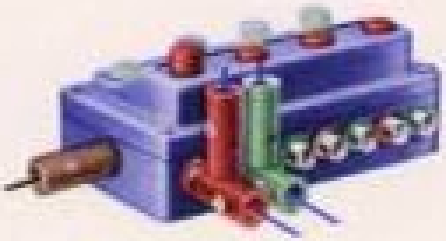


Fig. 9 Simultaneous operation of a warning signal and a home signal from the control plate

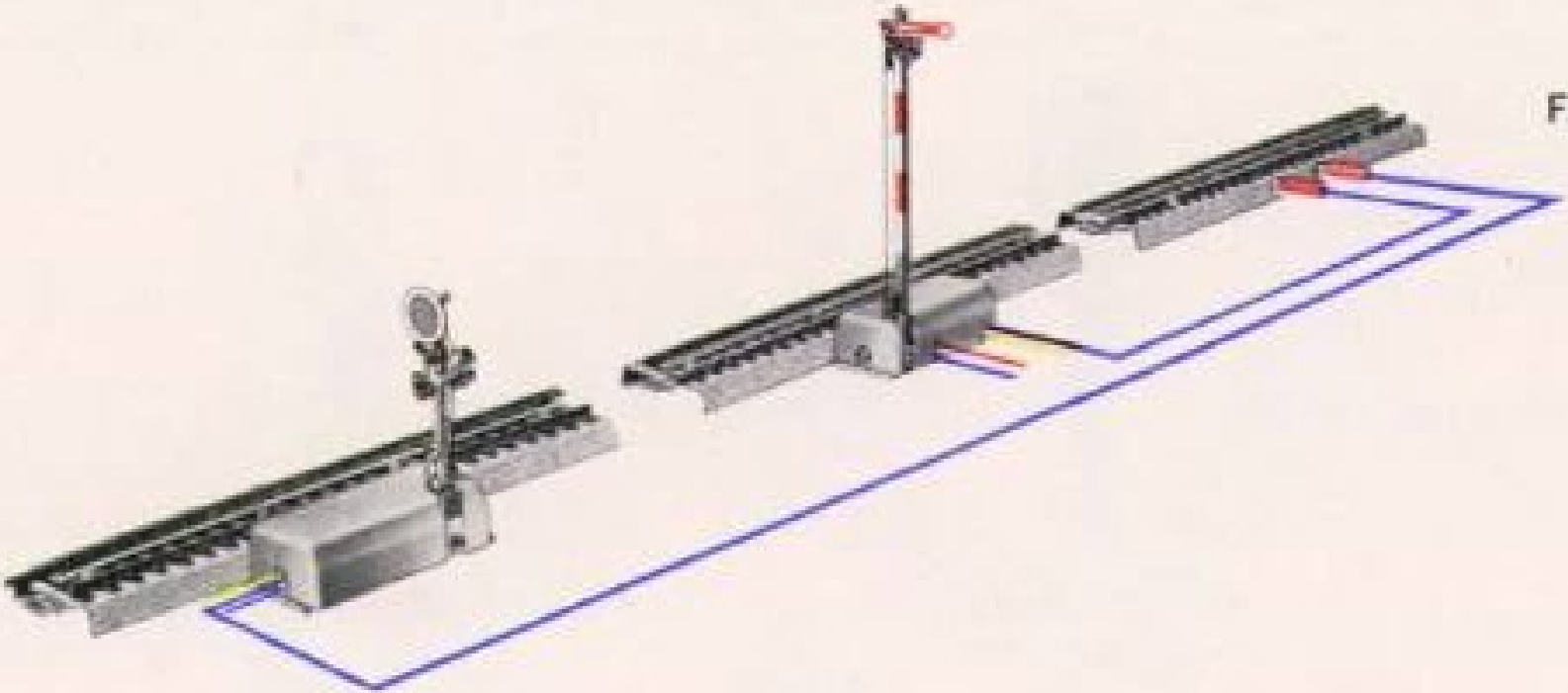


Fig. 10 Simultaneous automatic op
ration of a warning signal ar
a home signal. Signals a
moved into the "Stop" pos
tion by train passing over th
contact track section.

Purposes of the different signals

. Warning signal 446/1 and home signals 446/11 and 446/41

These signals are installed on a straight stretch of road where there are no switches behind the signals which could ead the train from its straight course.

The positions of these signals are illustrated in Figs. 11a 11f which follow:

Position of the Home Signals

Corresponding Position of the Warning Signal

446/11

Fig. 11a "Stop"

446/41

Fig. 11b "Stop"

446/1

Fig. 11c "Stop Signal Ahead"

Fig. 11d "Go"

Fig. 11e "Go"

Fig. 11f "Go Signal Ahead"

2. Warning signal 446/2 and two-position, two-arm semaphore 446/12

Where the train after passing the signal **must always** leave its **straight course** and be **diverted by a switch,** the home signal 446/12 and the warning signal 446/2 are in place. The warning signal has a fixed disc and a movable arm. Both arms of the semaphore are coupled, one arm cannot be moved independently. The positions of these signals are illustrated in Figs. 12a through 12d.

If it is possible for the train to enter a straight as well as a curved stretch of track after passing the signals, these are not the proper signals to be used here. In such a case, signals 446/3 and 446/13 which are described on the next page should be installed.

Position of the Home Signal

Fig. 12a "Stop"

Fig. 12c "Slow"

Corresponding Position of the Warning Signal

Fig. 12b "Stop Signal Ahead"

Fig. 12d "Slow Signal Ahead"

3. Warning signal 446/3 and three-position, two-arm semaphore 446/13

On the warning signal 446/3 not only the arm but **also the disc** is movable. The arms of the home signal 446/13 are **not coupled.** This gives each signals three different positions which are illustrated in Figs. 13a through 13f.

Position of the Home Signal

Fig. 13a "Stop"

Corresponding Position of the Warning Signal

Fig. 13b "Stop Signal Ahead"

Position of the Home Signal

Fig. 13c "Go"

Fig. 13e "Slow"

Corresponding Position of the Warning Signal

Fig. 13d "Go Signal Ahead"

Fig. 13f "Slow Signal Ahead

"Slow" or
reduced speed is always necessary where the train after having passed the signal must turn into a switch which wil lead it from its straight course. If the signals are set as in Figs. 13c or 13d, the train may therefore not be led from its straight course into a turn-out.

Accordingly it is recommended that the switch and the signal be set simultaneously. This can be done by inserting the green plug of the switch into the cross socket of the green plug on the signal and the red plug of the switch into the cross socket on the orange plug of the signal. Fig. 14 shows how this is done. The switch must be set on "Straight" when the signal is set on "Go" or on "Right" or "Left" when the signal is set on "Slow".

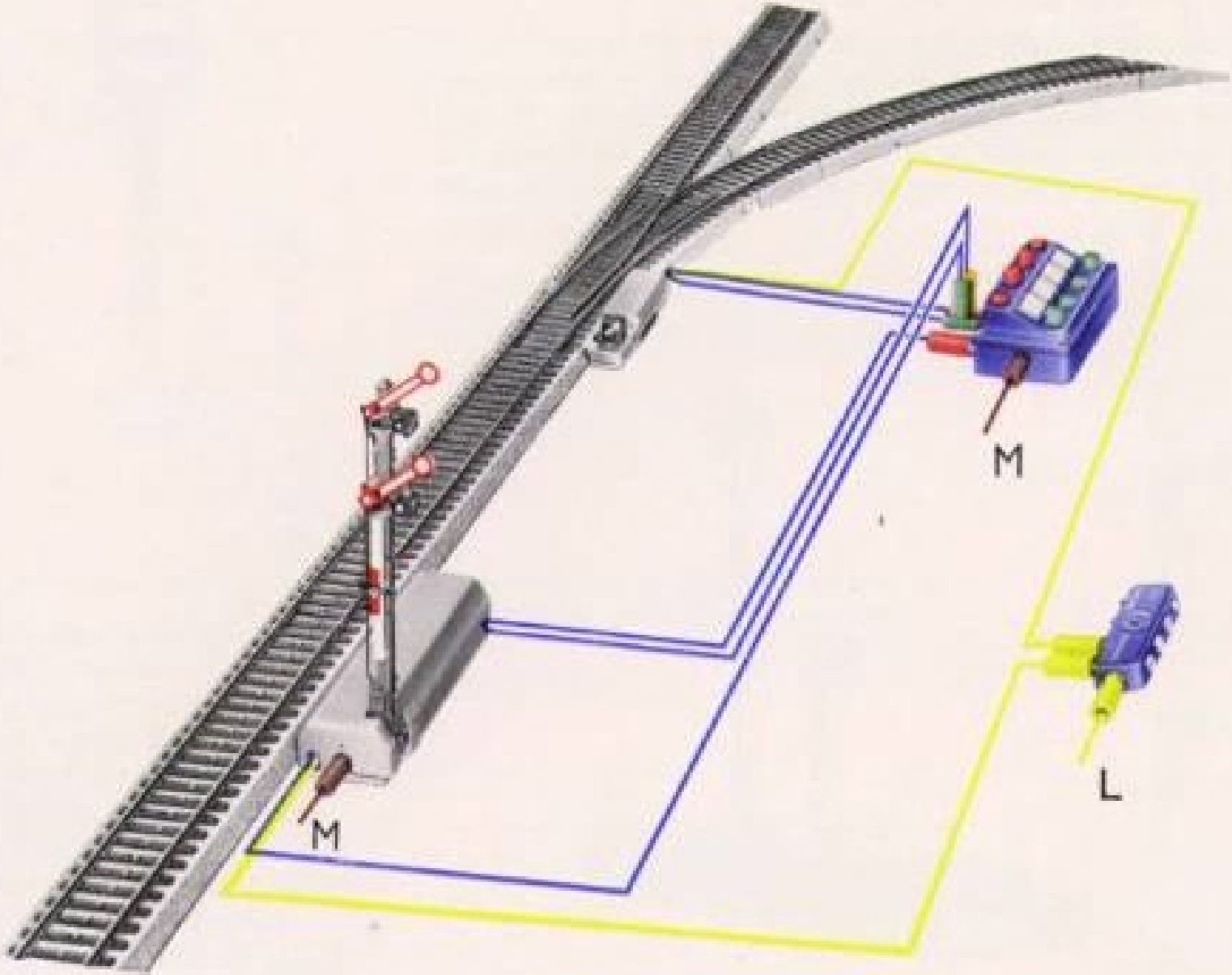


Fig. 14 Simultaneous operation of a switch and a three-position semaphore

The Yard Block Signal 446/21

This signal regulates traffic inside the yard limits. It can be placed singly or together with a semaphore. In such a case the semaphore applies to main line traffic while the yard block signal applies to switching as well as main line traffic. The positions of the yard block signal are shown in Figs. 15a and 15b.

Fig. 15a
"Stop"

Fig. 15b
"Proceed"

Fig. 16 Yard Block Signal and Home Signal at the Exit of a Station

This signal, also, is equipped with a train control mechanism, so that a locomotive cannot pass a signal which is set on "Stop". If one installs a yard block signal immediately in front of a home signal (Fig. 16), it is best to forego the use of the train control mechanism in the home signal, i. e. one uses only the red cables of the yard block signal, not those of the home signal. This is so because the yard block signal in the prototype must indicate "Proceed" before any train, not only a switcher, may pass it.

For switching, the yard block signal is set on proceed while the home signal is set on "Stop".

Before starting a main line run, however, the yard block signal is set on "Proceed" and the home signal on "Go". If it is not intended to conduct switching operations, both signals may be operated simultaneously (similar to Fig. 9).

The most important signals and their symbols

To facilitate understanding of the following track plans, the following symbols have been used for the various signals:

Warning Signal without arm
Can be used before all home signals.

446/1

Warning Signal with arm
Arm is movable, but disc is fixed. Is used in connection with semaphore 446/12.

446/2

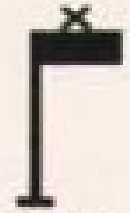
Warning Signal with arm and movable disc.
Belongs to semaphore 446/13.

446/3

Single Arm Semaphore

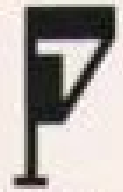
446/11

Light Signal
Is used in the same manner as the single arm semaphore.



446/41

Two-arm, two-position Semaphore
Arms cannot be moved separately.



446/12

Two-arm, three-position Semaphore
The arms can be moved separately.

446/13

Yard Block Signal

446/21

General Information Concerning Signals

Fig. 17 shows part of the track layout of a station. There follows a description of the installation of the signals.

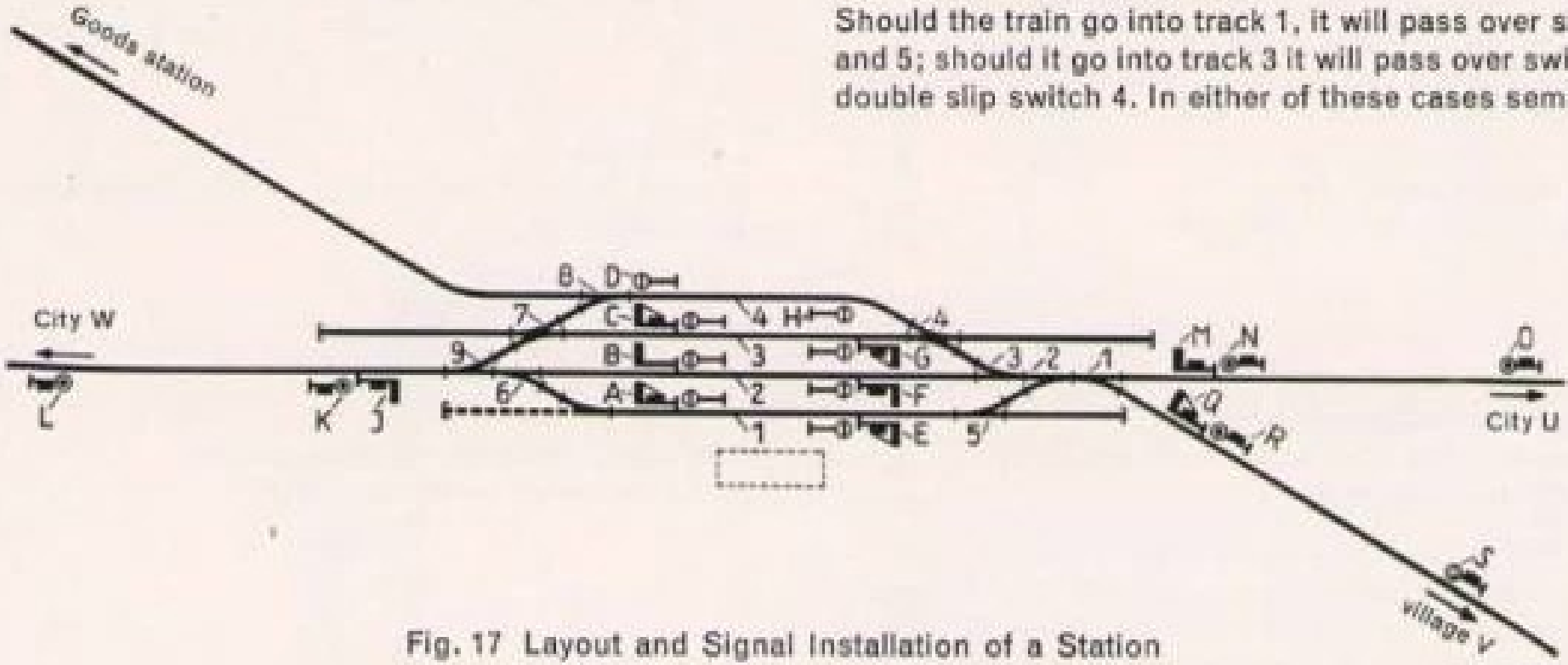


Fig. 17 Layout and Signal Installation of a Station

A train coming from City U first passes **Warning signal O** (446/3). This indicates to the engineer that at the following **home signal M** (446/13) he will have to

1. Stop
2. Proceed at full speed
3. Proceed at slow speed

The Semaphore M will not indicate "Slow" if the train is to enter track 2, because it will proceed on a straight course and not be diverted by a switch. The signal is set on "Go" (Fig. 13c). The engineer need reduce the speed only if the train is to enter track 1 or 3.

Should the train go into track 1, it will pass over switches 2 and 5; should it go into track 3 it will pass over switch 3 and double slip switch 4. In either of these cases semaphore M would be set at "Slow" (Fig. 13c). The **Warning Signal N** (446/3) which is located in front of the Semaphore M belongs to the **Semaphores A** (446/12), **B** (446/11) **and C** (446/12) in the station. If the train is to stop in the station, Signals A, B, or C will be set on "Stop". This the engineer will know in advance because the Warning Signal N showed neither a horizontal disc nor a diagonal arm (Fig. 13b).

If, however, the train is to pass through track 2 without stopping, the disc on Warning Signal would be in horizontal position. This means

"Go Signal Ahead" at Signal B

Should the train be expected to pass through tracks 1 or 3 without stopping, Warning Signal N would show a diagonal arm. This means:

"Slow Signal Ahead" at Signal A or C

A different situation would arise if the train were to enter the station from Town V. Here the direction of the train in any case would be diverted when it passes over switch 1. Therefore the two-position, two-arm **Semaphore Q** (446/12) suffices here. The **Warning Signal S** (446/2) with fixed disc belongs to this signal.

The **Distant Signal R** (446/3) corresponds to the Home Signals A, B and C in the station. The disc as well as the arms of this distant signal are movable.

The **Signals J, K and L** have purposes similar to the Signals M, N and O.

Trains which leave track 1 are diverted in their direction by switch 6 or switches 5 and 2. Hence the correct signal for **points A and E** would be the two-arm, two-position semaphore 446/12.

Trains leaving track 2 in the direction of City W **cannot** be diverted in their direction. For this reason a single arm semaphore (446/11) is adequate for **point B.**

A train leaving track 2 for City U cannot be diverted from its straight course, but should it leave for town V, it could be diverted over switch 1. Because of these two possibilities, a three-position semaphore (446/13) must be installed at **point F.**

Yard block signals have been installed in front of all home signals inside the station. These regulate traffic inside the station such as switching. If, for example, the locomotive on one of the trains is to be changed, it cannot move until the yard block signal is set on "Proceed". The home signal in this case would remain on "Stop".

From these instructions it should be a simple matter for the reader to find uses for the other signals which have not been named here.

Safety Switch

Should a train, coming from City U or Town V, enter Track 1 and ignore Signal A, a serious accident could result on Track 2. To avoid this possibility a safety switch can be installed before Switch 6 in a similar manner to Switch 5 (see Fig. 17, dotted line).

A train coming from City W and entering Track 1 cannot cause an accident if it passes a closed signal E. If the signal is closed, and the train should happen to pass it, the train will not enter track 2, but will proceed straight ahead to the bumper stop. It is advisable to wire the switch and the signal for simultaneous operation in the manner described on page 15 (also p. 24) so that the switch will be set on "Curve" when the signal is set on "Slow" and on "Straight" when the signal is set on "Stop".

The double slip switches 4 and 7 have also been installed as safety switches to protect the main line.

The Block System

Prototype railroads divide the main line between stations into blocks. At the beginning of each block there is a block signal which permits a train to enter the block only if no other train is within the block. Automatic block connections insure that the signal is set on "Stop" when a train is in the block and on "Go" after the train has left the block.

The MARKLIN home signals, operating in a similar manner, insure the safety of the main line so that several trains can be operated without there being any danger of crashes. The trains, themselves, determine the positions of the signals.

Layout with 1 Signal and 2 Trains

Fig. 18 shows the construction of such a layout. The one contact track section into which the red plug is inserted is placed about a train length behind the signal. The position of the second contact track section, into which the green plug is inserted, must be determined by experimentation. It depends on the speeds of the two trains. Generally it is best to place it half-way between the contact track section with the red plug and the circuit breaker 3600 Z. If this arrangement shows danger of two trains crashing, the section must be moved. Operation of two trains with only one signal does not guarantee absolute safety. Should one train happen to stop, or should the signal be closed manually, a crash would occur. In order to avoid such a rear- end collission, three signals should be used for two trains; four signals for three trains, etc. Always one signal more than there are trains.

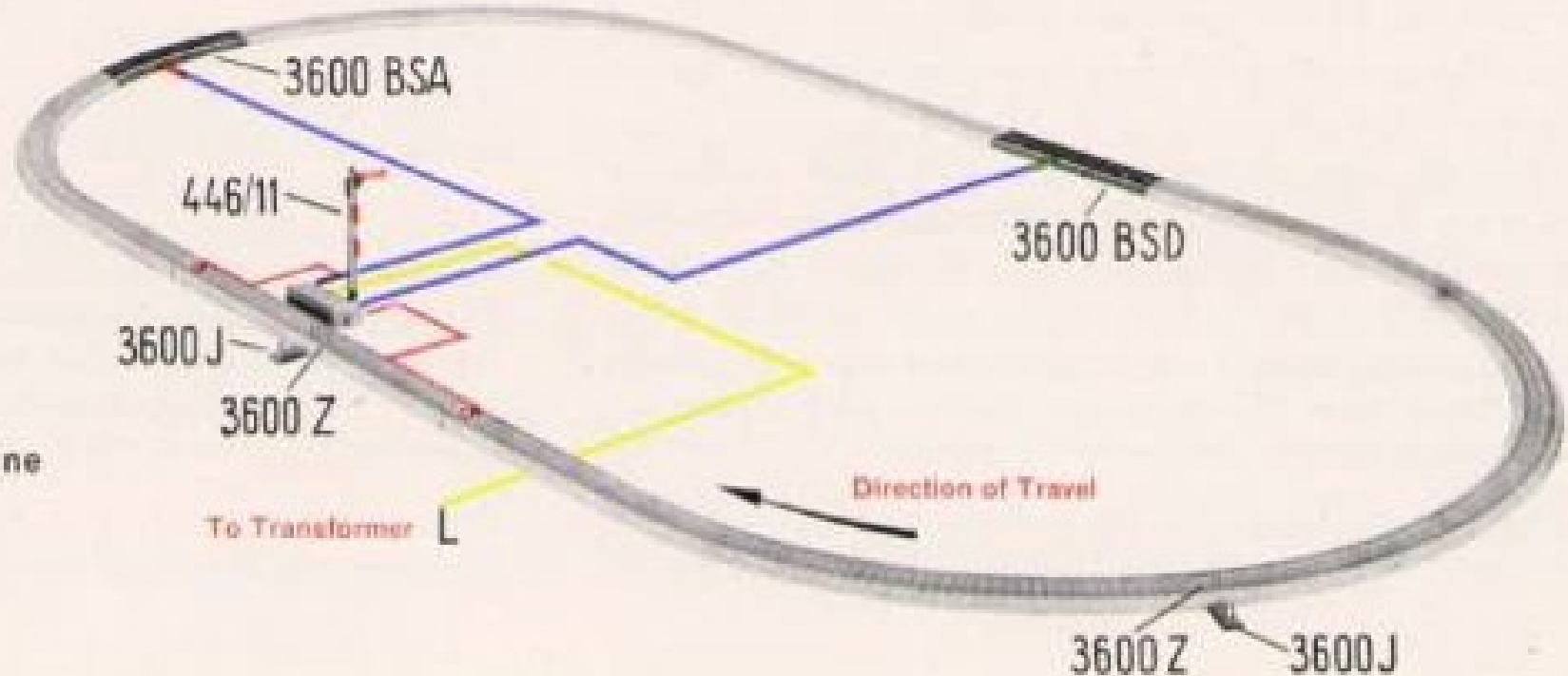


Fig. 18 Connection with one signal for automatic block operation

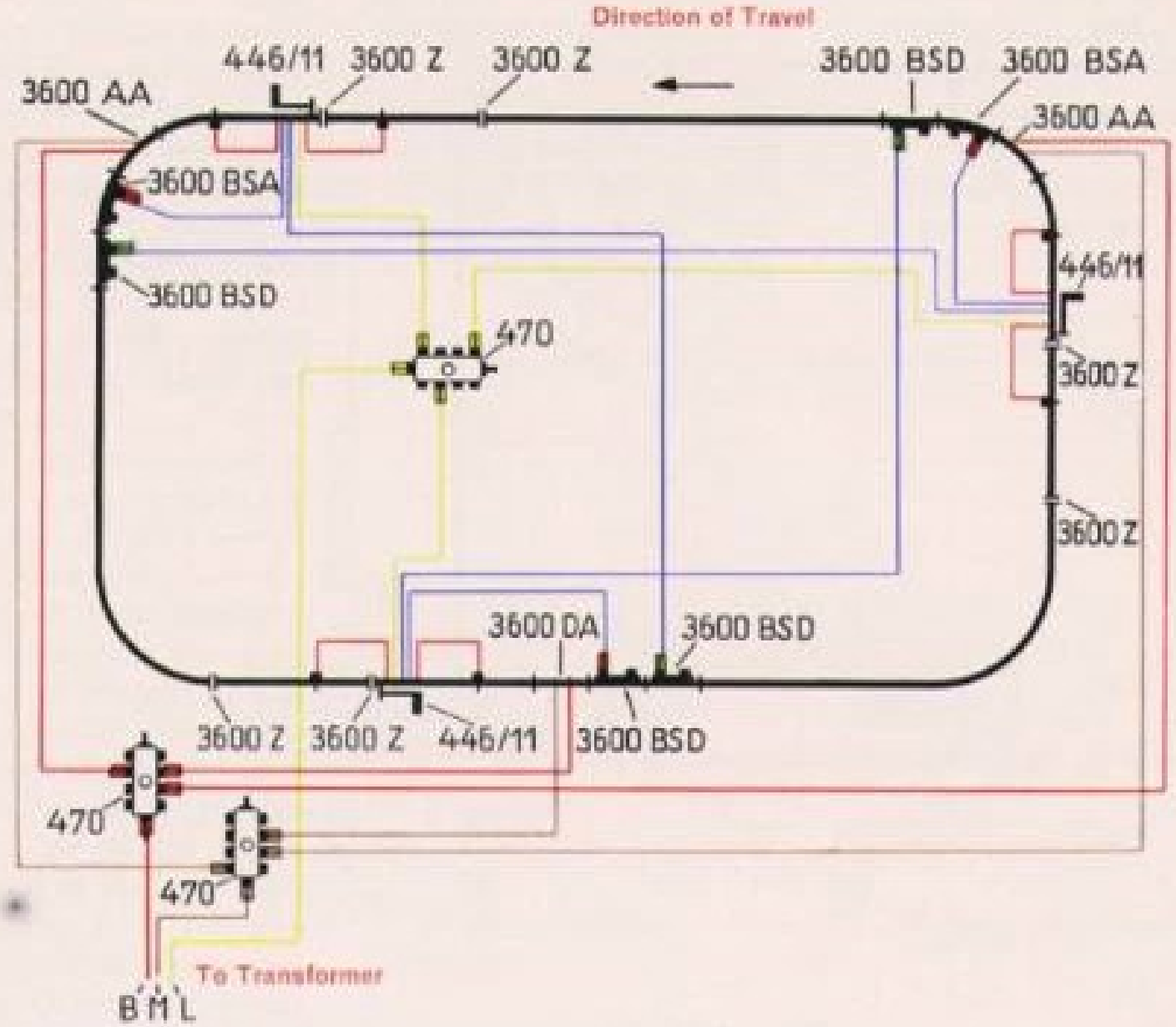


Fig. 19 Automatic loop with two trains on one oval of track.

Layout with 3 Signals and 2 Trains

Fig. 19 shows us such an installation. It is also possible to insert both the red plug from one signa and the green plug from the preceding signal into the same contact track section.

Layout with 5 Signals and 4 Trains

The construction of such a ayout is similar to the layout with 3 signals and 2 trains. Fig. 20 shows how to do it. Layouts with even more trains and signals can be built in a similar manner. If many trains are to be used, the load for one transformer becomes too heavy and two or more transformers must be used. Here it is best to divide the layout into several circuits and assign a transformer to each one (Fig. 20).

The following is of utmost importance on layouts such as those shown in Figs. 19, 20, and 22:

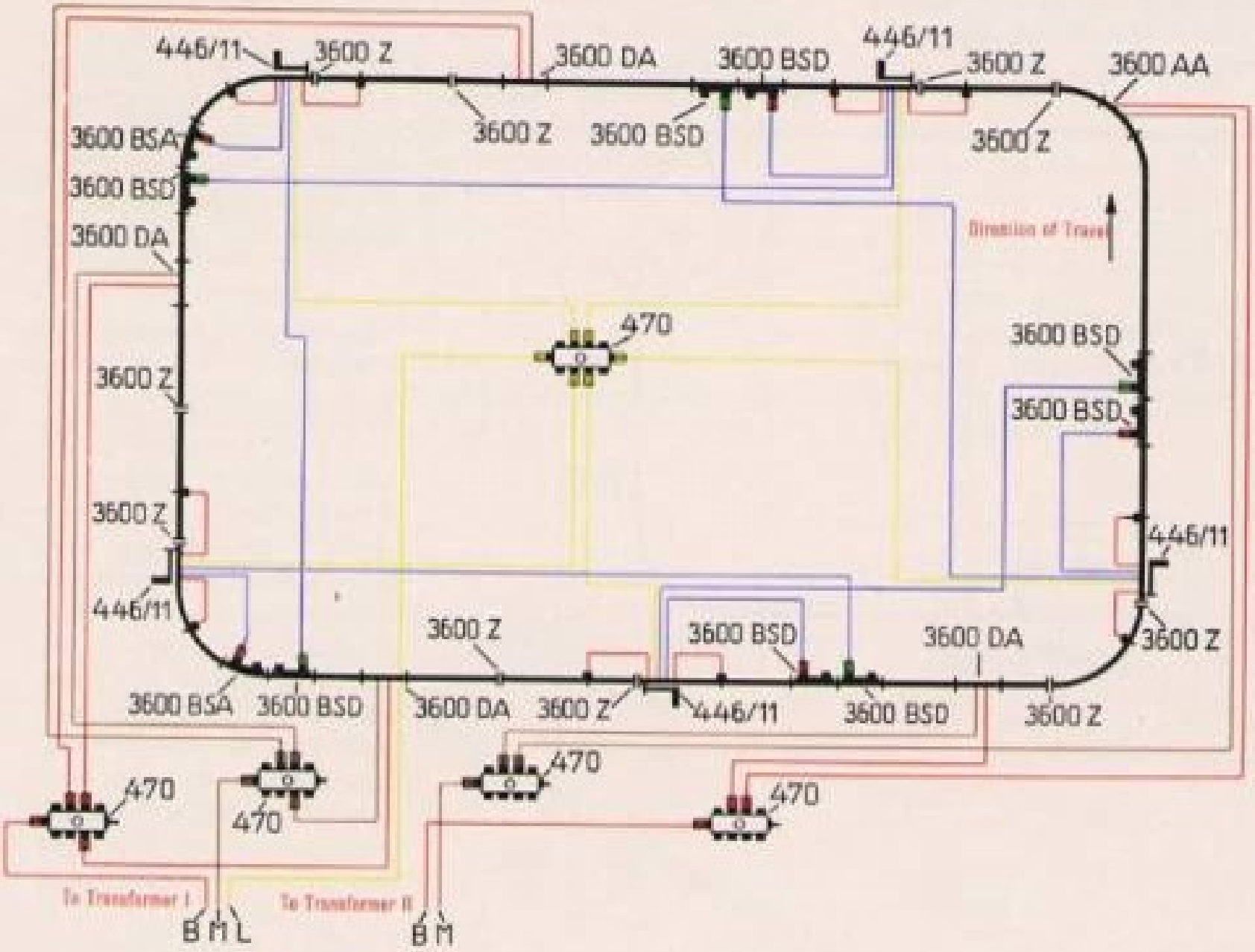


Fig. 20 Layout and connections of the blocks

For each and every block signal there must be a terminal track section or a third rail cable 3600 AK. This must be installed between the next following block and the circuit breaker 3600 Z. The easiest way of doing this is to place a third rail connection (Terminal track or third rail cable) behind each signal and to run these connections into a distributor plate 470. This is then connected with the red socket on the transformer (Fig. 19 and 20). If trains are operated from the overhead wire, the catenary must be connected in a similar manner as the third rail. A short distance behind each block signal there is the contact track section which closes the signal. Into this track section or a section close to it is inserted the connection which opens the preceding signal (Fig. 19, 20, and 22). Some of the ground (brown) connections shown in Fig. 19 and 20 are superfluous and may be omitted.

Layout with 2 Block Signals and 2 Trains which operate in opposite directions

In this layout Switch I is set so that the train will enter the **inside** track, while Switch II is set so that the train enters the **outside** track.

In setting up such a layout it must be observed that the distance between the circuit breaker 3600 Z and the contact track section is greater than the length of the train so that the train will not stop on the contact track section (see Fig. 21). This would prevent the signals from operating properly.

The Connection of the Warning Signals

has been omitted in Figs. 18, 19, 20, or 21 because it would have made the diagrams more confusing. Their installation is, however, a simple matter. One merely connects their blue cables with the same contact track sections which control the home signals before which the warning signals are installed. For example the red plug of a warning signal would be inserted into the same contact track section as the red plug of its home signal.

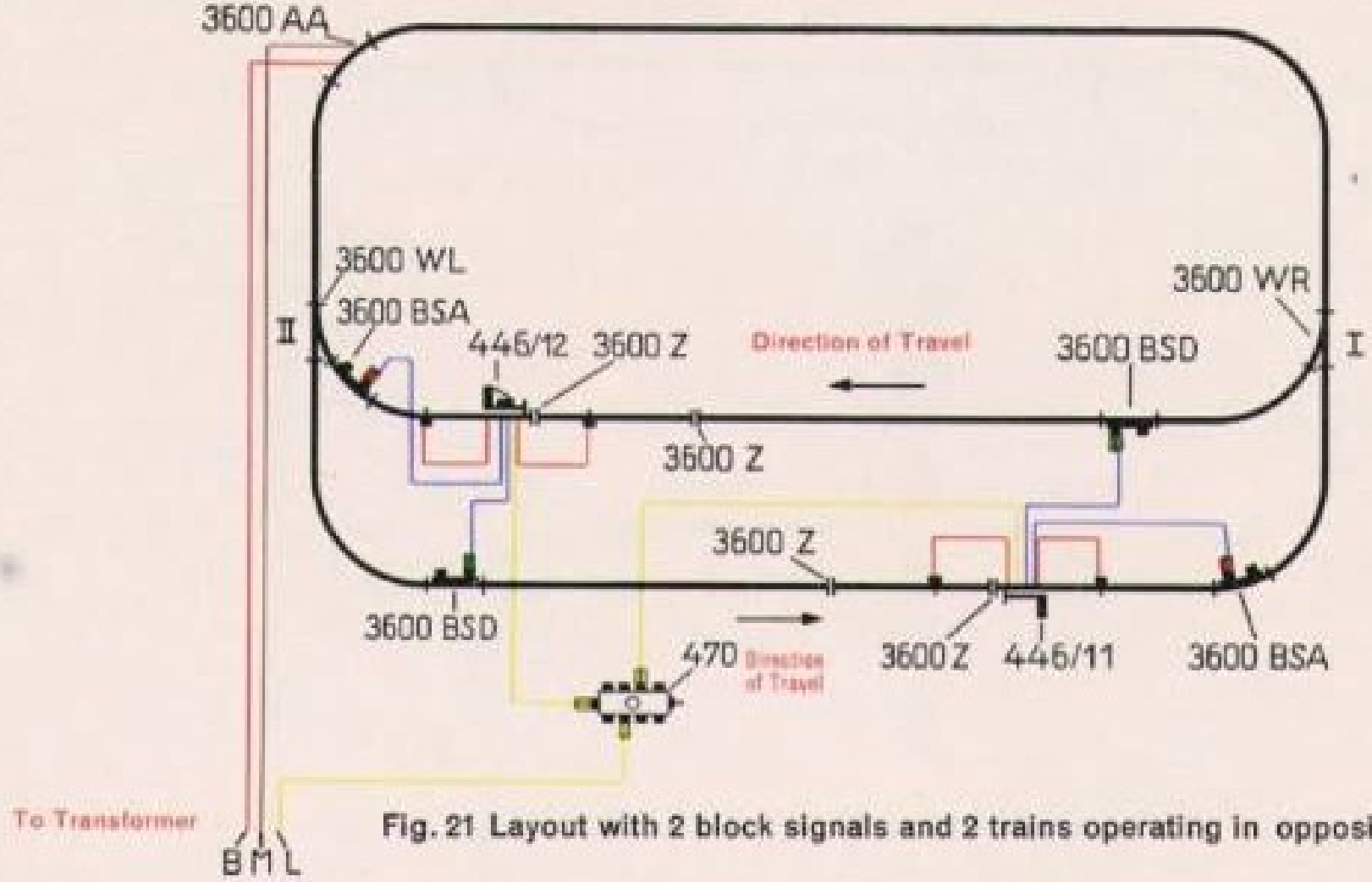


Fig. 21 Layout with 2 block signals and 2 trains operating in opposite directions.

Automatic Block Operation on a Layout with Sidings

The layout shown in Fig. 22 is designed for the operation on 5 trains which alternately enter the sidings. The track drawing here has been greatly simplified. The signals and the switches which are part of the block system have been given consecutive numbers. Their connection to the respective contact track section is not drawn, but is indicated by numbers and letters.

For example:

3r Into this contact track section the red plug from signal 3 is to be inserted; or 9g and 11g — into this contact track section the green plug of signal 9 and the green plug of switch 11 is to be inserted. 6o means that the orange plug of signal 6 is to be inserted etc.

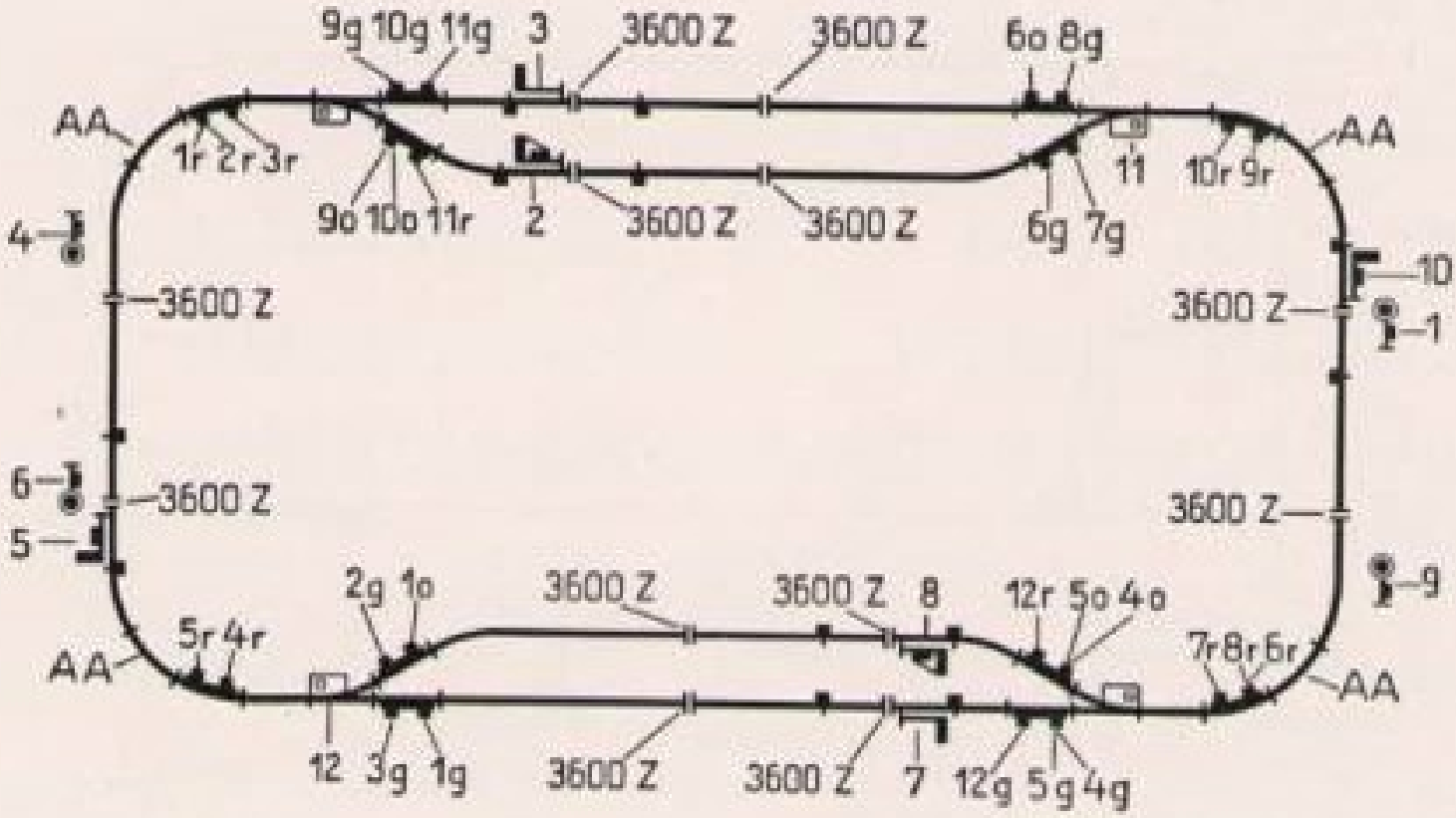


Fig. 22 Block operation on a layout with sidings

Push-Off Signal 446/22

The push-off signal is installed on the double incline. It is used to control the pushing off of freight cars into the sorting gridiron and the speed at which this operation is to take place. The individual positions of the signal are shown in Figs. 15c to 15e.

Symbol 446/22

Fig. 15c
"Stop! No Pushing Off" obtained through blue cable with red plug

Fig. 15d
"Push Off Slowly" obtained through blue cable with orange plug

Fig. 15e
"Push Off at Moderate Speed" obtained through blue cable with green plug

Connections for Single-Track Lines with Two-Way Traffic

If right-hand traffic is used, only the signals placed to the right of the track apply to the running train. However, owing to the way MARKLIN home signals are connected, the train will react also to the left-hand signals. This inconvenient can be corrected by methods such as:

1. Appropriate arrangement of signals. The signals are installed on single-track lines as shown in Fig. 23 so that 2 signals applying to opposite directions are connected to a common dead section.

2. Supply of current through control plate 475/4. The connections required are shown in Fig. 24.

Fig. 23

If a train coming from the right runs over the track, the operating current is led through the control plate 475/4 to the insulated section (through the third rail connecting cable 3600 AK). The train can thus pass the signal without switching it to the "Go" position.

3. Using universal remote switch 446/91.

The supply of current as shown in Fig. 24 can be automatically controlled by means of universal remote switch 446/91. The connections required are shown in Fig. 25. A remote switch is not required for each signal in every instance. Fig. 26 shows how to control 4 signals of a layout by means of one universal remote switch so that trains can pass in either direction without interference from left-hand signals.

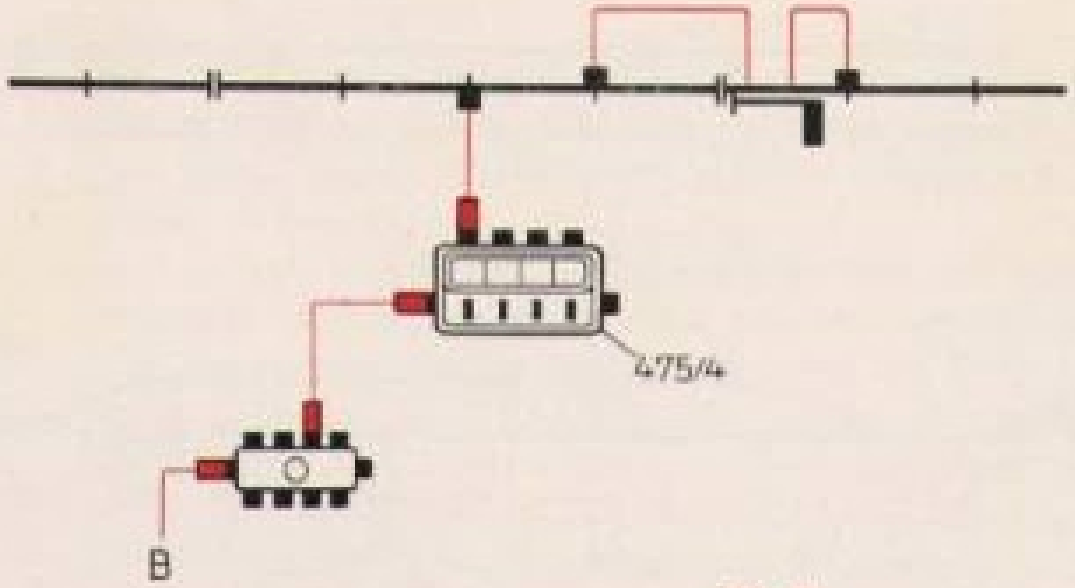


Fig. 24
Connections for current supply through control plate 475/4

The two sockets of the universal remote switch 446/91 are each connected to a control plate. One of these control plates supplies current to the insulated sections in front of the signals serving clockwise traffic and the other to those serving counterclockwise traffic. All other sections of the layout receive current from a third, distributor plate 470. Shown in Fig. 26 are only the cables supplying

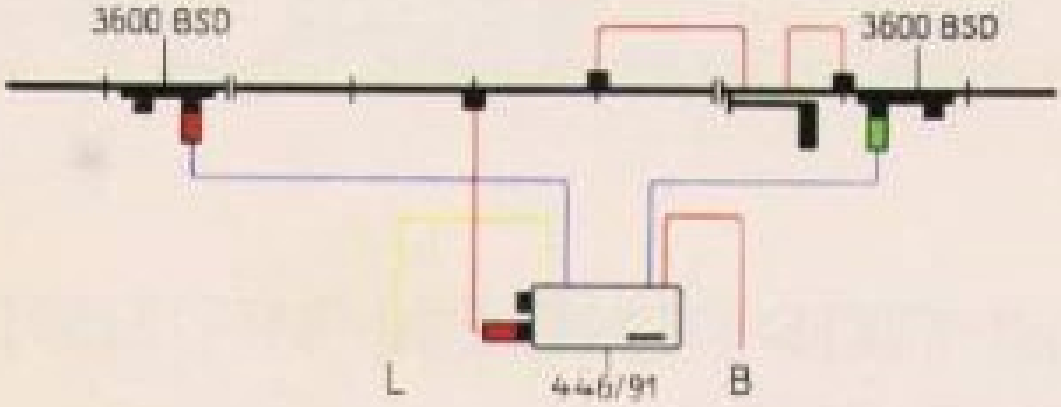


Fig. 25 Connections when using universal remote switch 446/91

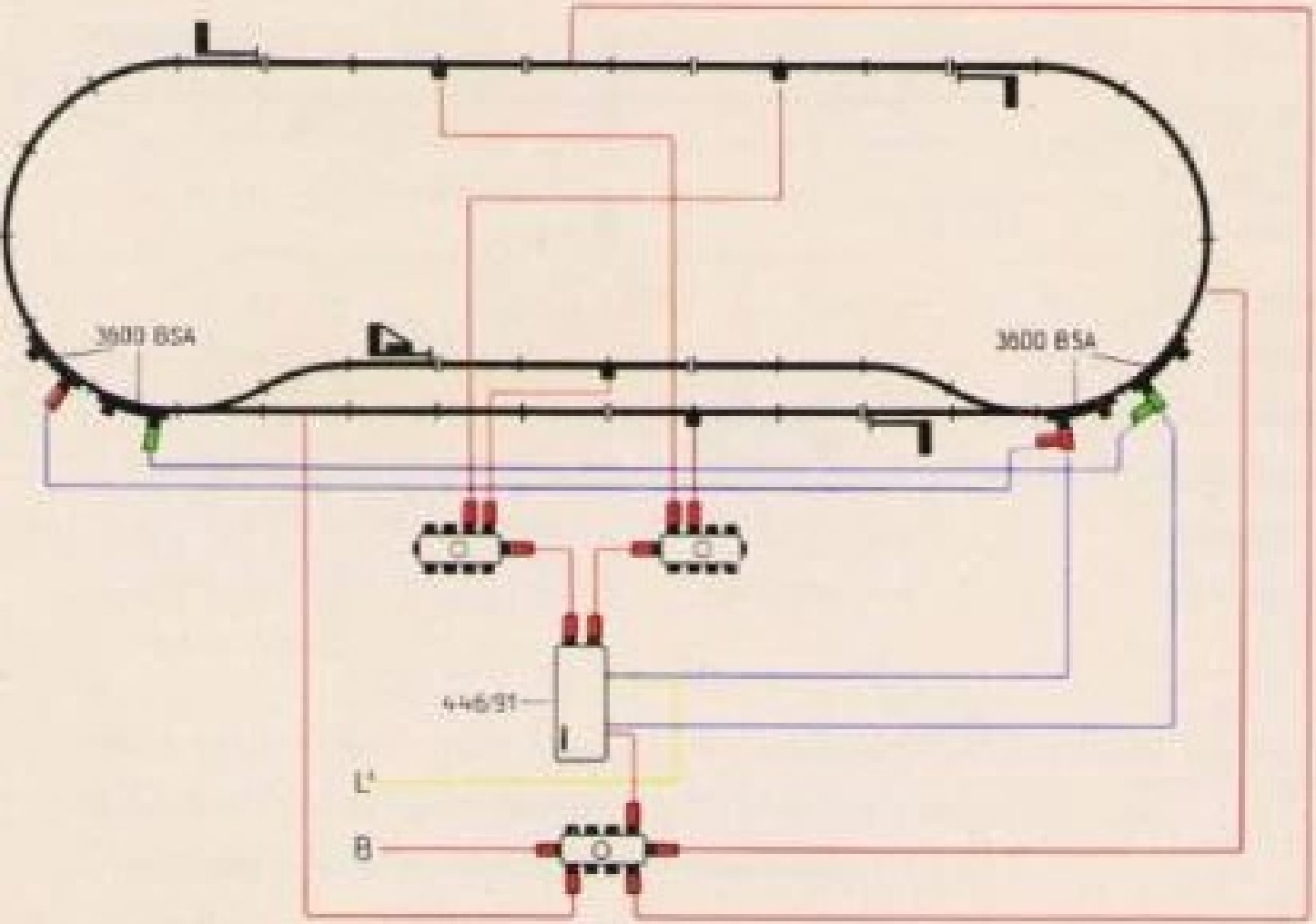


Fig. 26 Layout with 4 signals controlled by universal remote switch

operating current (from terminal track sections or 3600 AK). The contact track sections indicated are connected to the universal remote switch by means of the blue cables with the red or the green plugs, depending on the colors specified for them.

Needless to say that the number of signals controlled by the universal remote switch in one and the same oval of track can be increased as desired. The universal remote switch also has a great many other uses. The connections required for these are shown in the operating instructions supplied with the switch.

GEBR. MÄRKLIN & CIE. GMBH · GÖPPINGEN/WÜRTT.

Manufacturers of High Class Metal Toys

Printed in Western Germany

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Imprimé en Allemagne

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n of a 3-position, 2-arm semaphore with

greater detail here.

Fig. 22 the 3-position semaphore and the affect each other. The necessary contacts the contact track sections behind signals 2 owing manner:

10o and 11r into the contact track section
al 2 and

10g and 11g into the contact track section
al 3.

train pass Signal 2, it will, when it passes track section, set Signal 10 on "Slow" and Curve". The following train then proceeds track as far as the 2-position, 2-arm sema- which in the meantime has been set on

ver, a train pass Signal 3, it will, upon e contact track section, set Signal 10 on ch 11 on "Straight". Now the following

train would enter the vacant track and pro
Signal 3, which in the meantime has been
The home signal 446/13 could also be co
switch in the manner shown in Fig. 14.

In closing it should be pointed out that onc
principles outlined in this booklet are under
culty should be experienced in setting up ar
layout with the MÄRKLIN Block System,
complicated the layout might be. The conn
in this booklet will be found in most types
and over again, either singly or in combinat
That is one of the main features of the block s
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an automatic block system with which many
safely operated over the layout. Those wh
few experiments and thought out the correc
will have no difficulty in progressing to la
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railroad layout becomes greater and greater a
is achieved. The MÄRKLIN Block Systen
one of the means to that end.