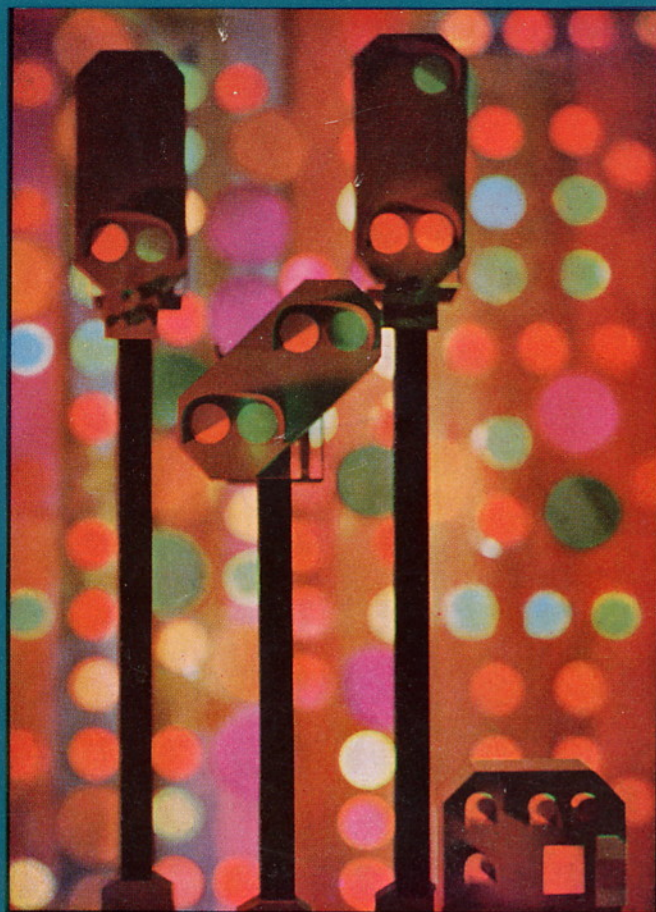


MÄRKLIN



Signal
Manual
0361

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MÄRKLIN

MÄRKLIN H0 Signals

a plus

for every railroad fan

There are many reasons why railroad fans ask for MÄRKLIN Signals and buy them.

There are also many reasons why signals are appreciated and popular by a larger growing circle of railroad fans.

But – the technical development continues.

The changing of the signal system of the German Federal Railways is going with their electrification. The former signals are being changed to the new light signals, which give a better safety operation, and less maintenance.

The station area of the prototype is therefore much more dominated by light signals, which control the whole system.

Rather than provide a detailed instruction sheet for the installation and operation of our signals with each set, we have decided to issue this signal manual. In this manual we can describe in much greater detail the many uses and make it easier for you to understand the entire system.

Gebr. Märklin & Cie. GmbH · 732 Göppingen/Württ.

The purposes of the signals

Just as the signals of the German Federal Railways control the many movements of the trains, the MÄRKLIN Signals provide you with many special operating functions.

Three groups of signals are used:

- I Home signals (Hp)
- II Distant signals (Vr)
- III Dwarf siding signals (Sh)

I Home signals

The home signals (Fig. 1) show if the track section ahead can be used by a train.

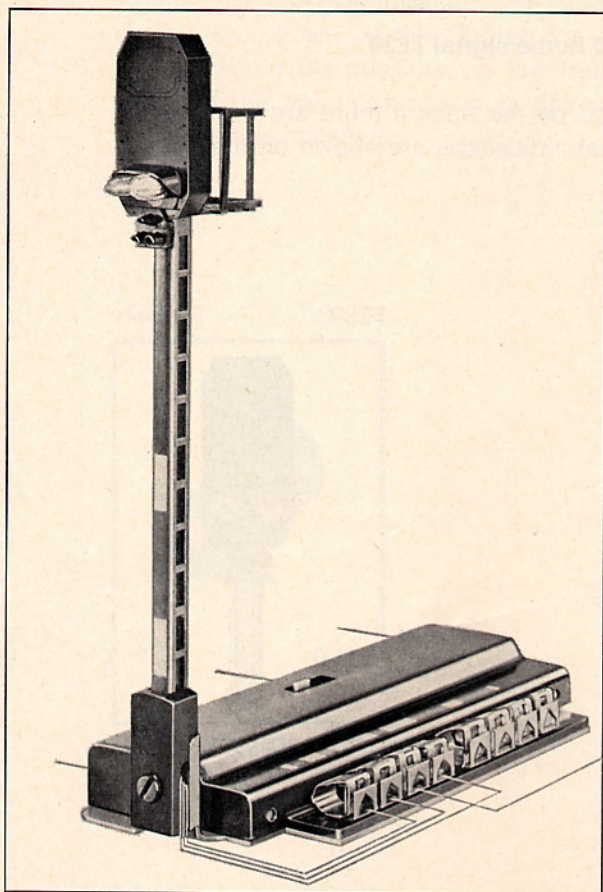
II Distant signals

The distant signals (Fig. 2) show the indication of the next home signal.

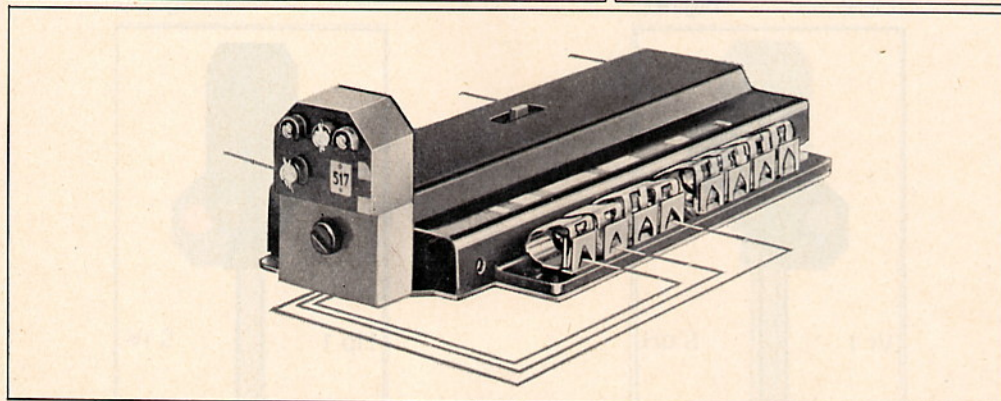
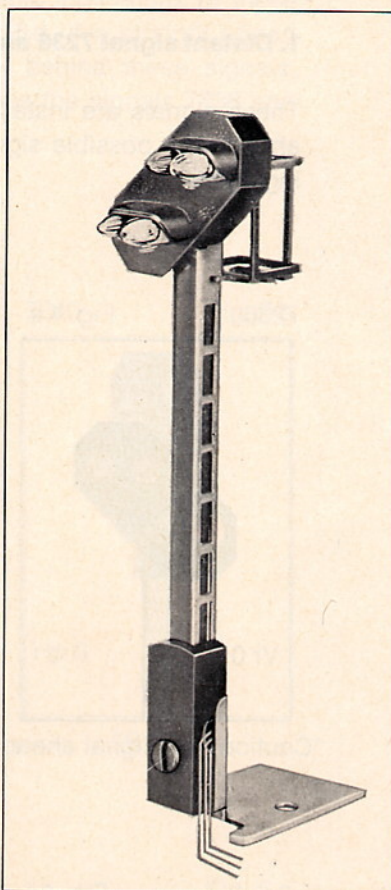
III Dwarf siding signals

The dwarf siding signals (Fig. 3) are used to protect the main line against trains upon sidings.

Home signal Fig. 1



Distant signal Fig. 2



Dwarf siding signal

Fig. 3

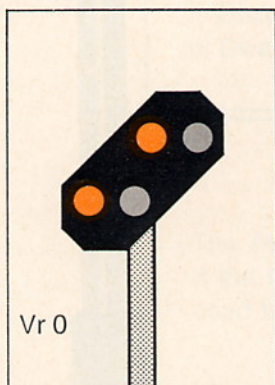
The uses of the various signals and their indications

1. Distant signal 7236 and home signal 7239

These signals are installed on the track if there are no turnouts ahead. The possible signal indications are shown on the following figures.

7236

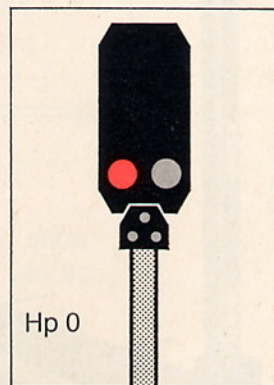
Fig. 4 a



"Caution, red signal ahead"

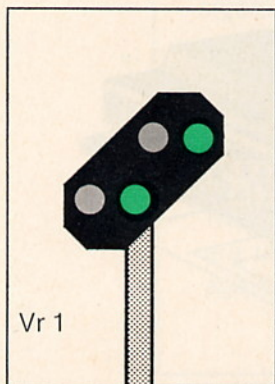
7239

Fig. 4 b



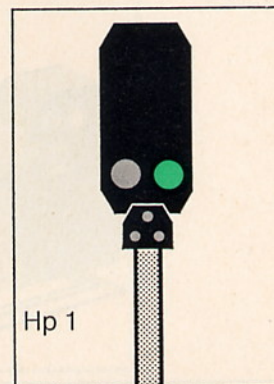
"Stop"

Fig. 4 c



"Proceed, signal ahead"

Fig. 4 d



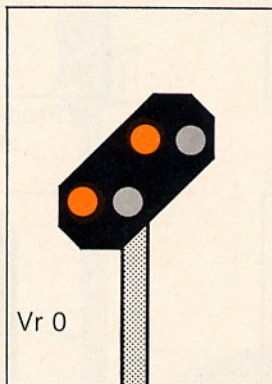
"Proceed"

2. Distant signal 7237 and home signal 7240

In instances where there is a turnout in the main line and the train must slow down, the home signal 7240 and the distant signal 7237 must be installed. The possible indications of these signals are shown on the Figures 5a – 5d. If a straight ahead course would be possible on the track behind these signals, these signals can not be used. In this case the signals 7238 and 7241 must be installed.

7237

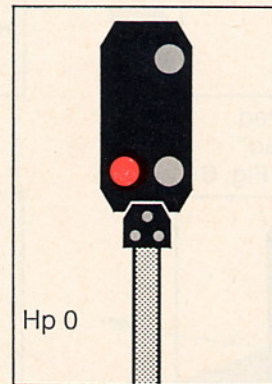
Fig. 5 a



"Caution, red signal ahead"

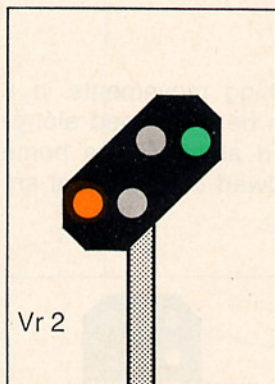
7240

Fig. 5 b



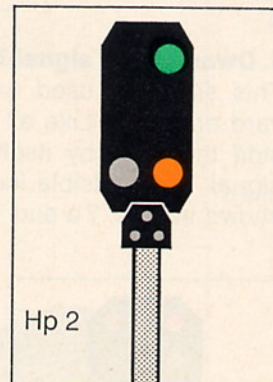
"Stop"

Fig. 5 c



"Slow, signal ahead"

Fig. 5 d



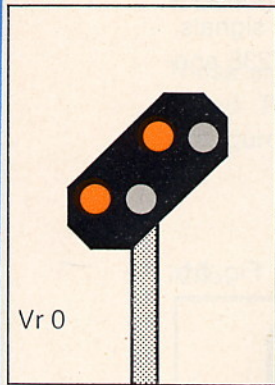
"Slow"

3. Distant signal 7238 and home signal 7241

These signals can indicate three various positions. They are always installed where a turnout and a straight ahead course is possible.

7238

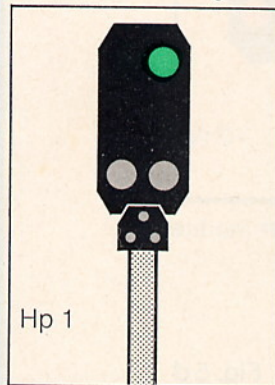
Fig. 6 a



Vr 0

"Caution, red signal ahead"

Fig. 6 d

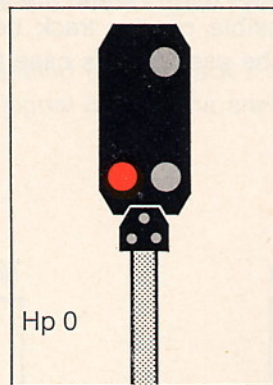


Hp 1

"Proceed"

7241

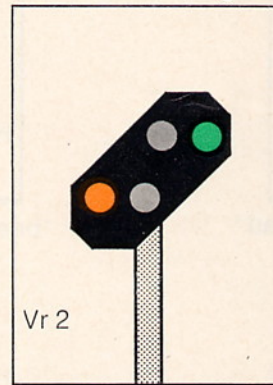
Fig. 6 b



Hp 0

"Stop"

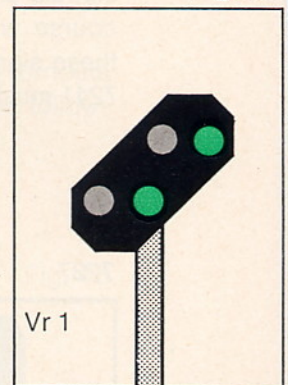
Fig. 6 e



Vr 2

"Slow, signal ahead"

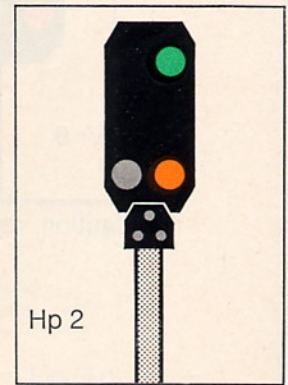
Fig. 6 c



Vr 1

"Proceed, signal ahead"

Fig. 6 f



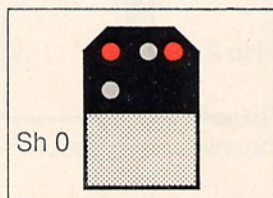
Hp 2

"Slow"

4. Dwarf siding signal 7242

This signal is used for controlling switching movements in a yard or siding. Like all other signals it can be positioned alongside the track by itself, or it can be used along with a home signal. The possible indications with this dwarf siding signal are shown in Figs. 7 a and 7 b.

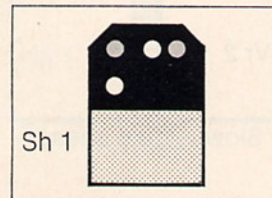
Fig. 7 a



Sh 0

"Stop"

7242



Sh 1

"Proceed"

Fig. 7 b

The construction of the MÄRKLIN Light Signals

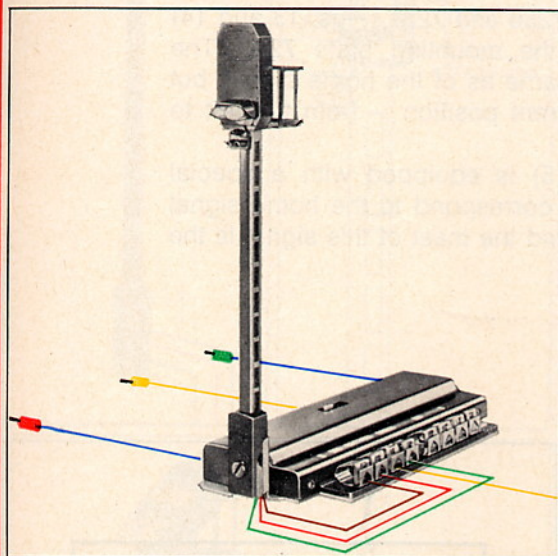
The **Home signals** 7239 (Fig. 8), 7240 (Fig. 9) and 7241 (Fig. 10) consist basically of two parts:

- the signal solenoid control unit (Fig. 11 a and 11 b) and
- the signal mast (Fig. 12 a and 12 b).

The **signal solenoid control unit** is necessary on all signals with train control, also on signal 7239, 7240, 7241 and 7242, and on the distant signal 7238 (because there are three various signal indications). The solenoid control unit consists of the mounting plate, the operation part and the cover case. The electrical operating current runs through the coils (wires with plug).

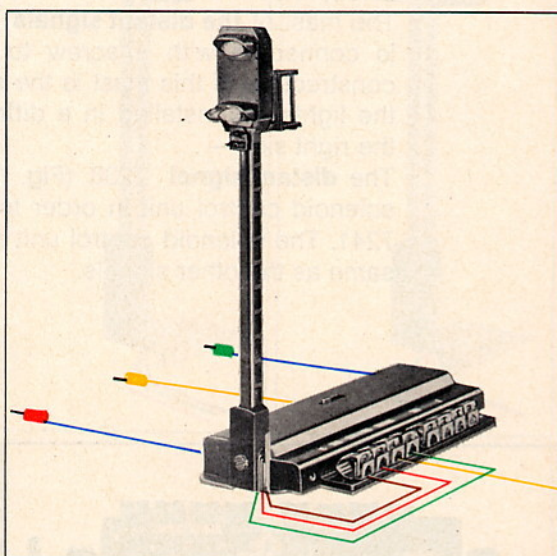
Fig. 8

Home signal 7239



Home signal 7240

Fig. 9



Home signal 7241

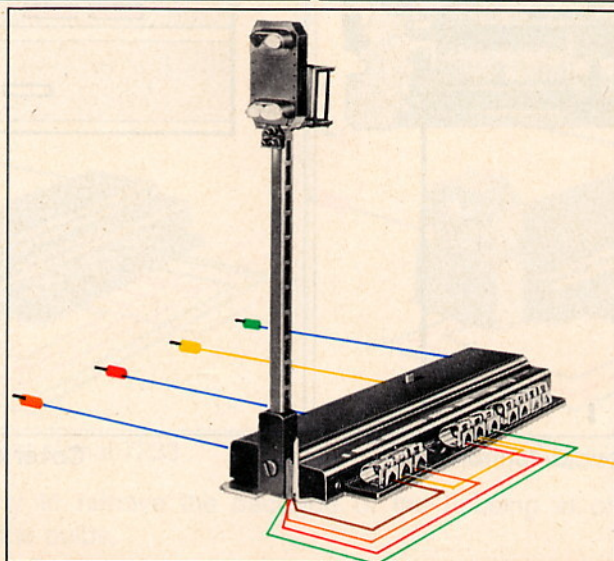


Fig. 10

The movable armature is magnetized by the electrical current and it is moved to various positions. This armature is connected with the operation plate of the operation part. The electrical current is fed through the current contact points into the track or into the overhead wires. The current for the signal lights is also fed through these contact points (wire terminals).

The current connection is easy and it is identified by the color strip on the cover case (Fig. 11 b).

The **signal mast** (Figs. 12 a and 12 b) is connected to the signal solenoid control unit with a screw. The bulbs, which are mounted on the top of the signal mast, can be replaced when the platform of the mast is removed and the contact plate is lifted up (Fig. 12 b). The various colored wires are soldered on the contact plate. These wires can be connected to the terminals of the solenoid control unit.

The mast of **the distant signals** 7236 and 7237 (Figs. 13 and 14) is connected with a screw to the mounting plate 7230. The construction of this mast is the same as of the home signal, but the lights are installed in a different position – from the left to the right side –.

The **distant signal** 7238 (Fig. 15) is equipped with a special solenoid control unit in order to correspond to the home signal 7241. The solenoid control unit and the mast of this signal is the same as the other signals.

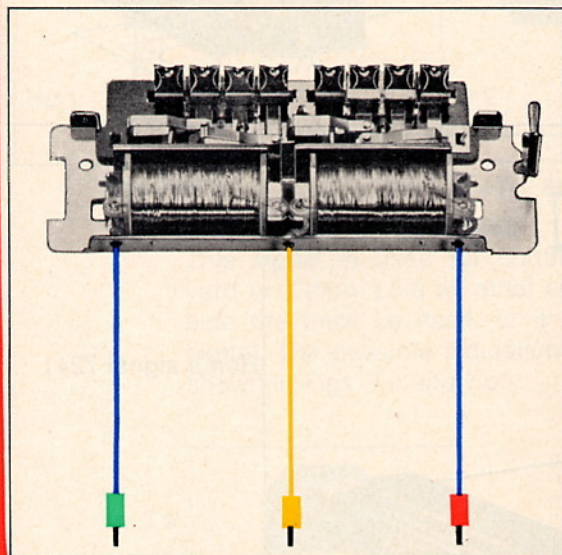
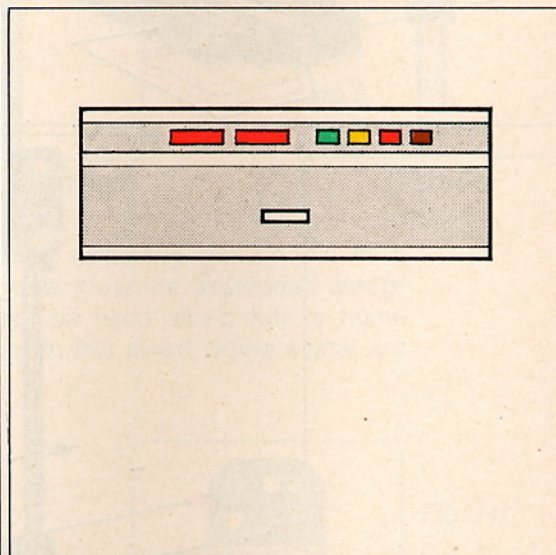


Fig. 11 a

Solenoid control unit



Cover case

Fig. 11 b

The **dwarf siding signal** 7242 (Fig. 16) has the same solenoid control unit, but no mast.

Two light bulbs are therefore installed in the housing in order to give the signal indication with white and red lights. It is

Fig. 12 a
Signal mast

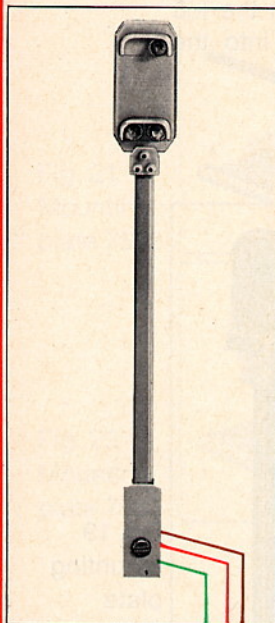


Fig. 12 b

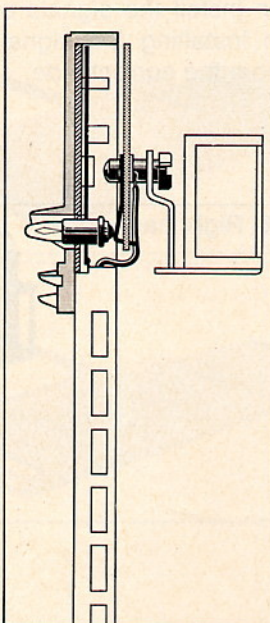


Fig. 13
Distant signal 7236

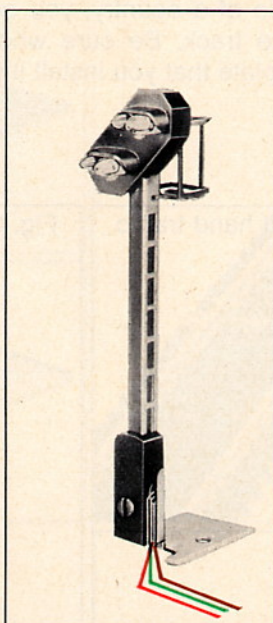


Fig. 14
Distant signal 7237

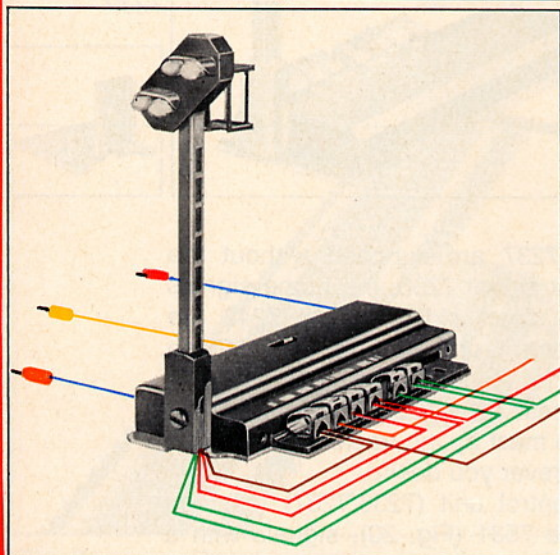
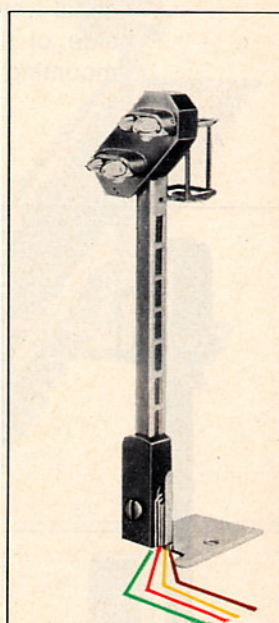
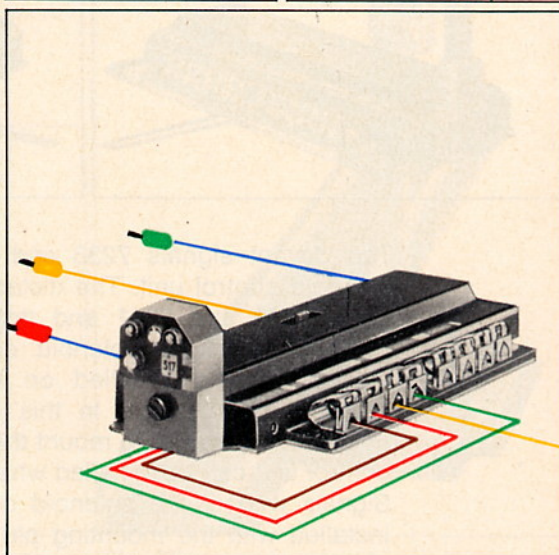


Fig. 15

Distant signal 7238



Dwarf siding signal 7242

Fig. 16

very easy to remove the backside of the housing in order to change the bulbs.

The installation of the signals

The signal 7236 and all others can be installed anywhere on the layout – on straight as well as on curved track sections. They can be fastened securely by pressing the track down into the signal mounting plate. If the signals are to be screwed to a wooden base next to the track, the signal cover case must be removed first. The wood screws pass through the two holes in the mounting plate. If you prefer left hand traffic, as may be the usual traffic of a country, you can install the signals on the left side of the track. Be sure when installing the signal into the mounting plate that you install it from the correct side.

Fig. 17 Left hand traffic

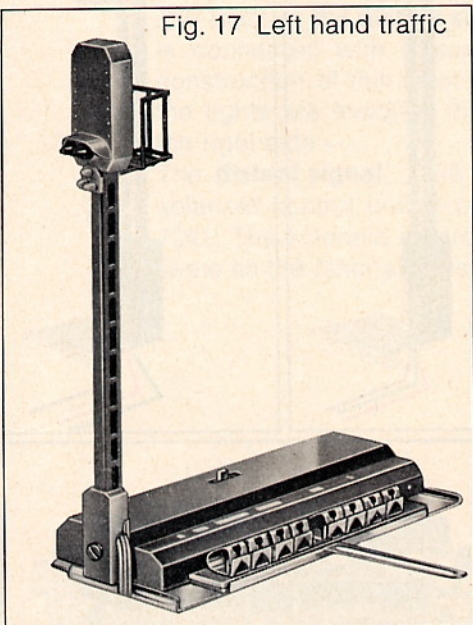


Fig. 18 Right hand traffic

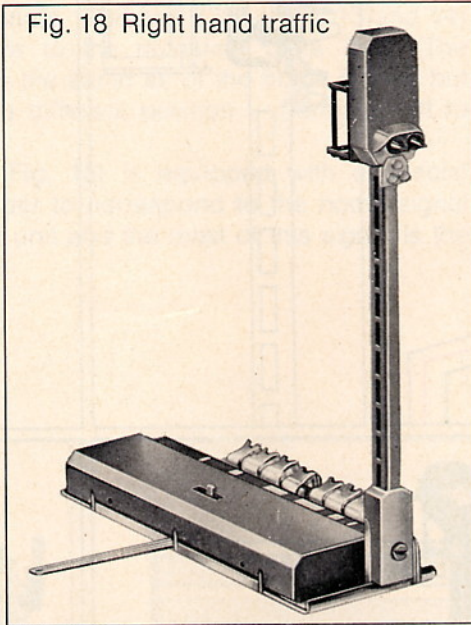
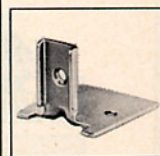


Fig. 19
Mounting
plate
7230



The distant signals 7236 and 7237 are supplied without the solenoid control unit. The distant signal 7238, the home signals 7239, 7240 and 7241 and the dwarf siding signal 7242 are equipped with the solenoid control unit. The mast of these signals can be installed on the layout separately from the solenoid control unit. In this case, the mounting plate 7230 (Fig. 19) is required to mount the mast by the track. The solenoid control unit can be installed wherever you desire.

Signals without the solenoid control unit (7236/7237) must be installed with the mounting plate 7531 (Fig. 20), signals with a small solenoid control unit (7238/7239/7240/7242) on the mounting plate 7532 (Fig. 21) and the signal with the large solenoid control unit (7241) on the mounting plate 7533 (Fig. 22) when using it with 2100 Series Track (Figs. 23–25).

Fig. 20
Mounting
plate 7531

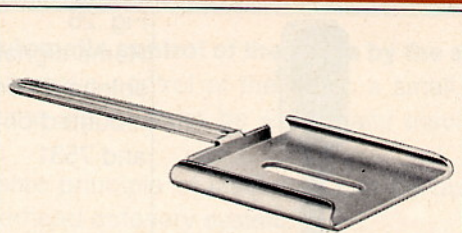


Fig. 21
Mounting
plate 7532

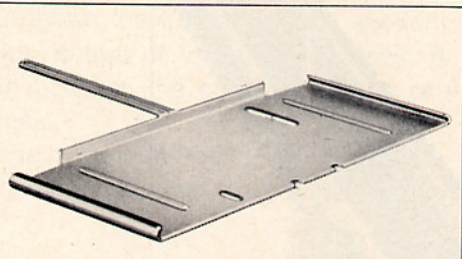


Fig. 22
Mounting
plate 7533

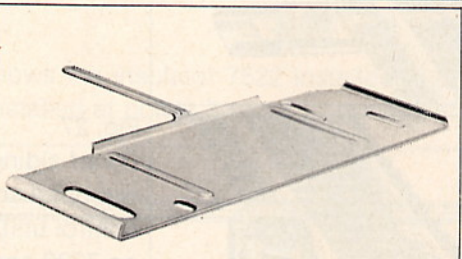


Fig. 23
Distant signal
mounted
on 7531

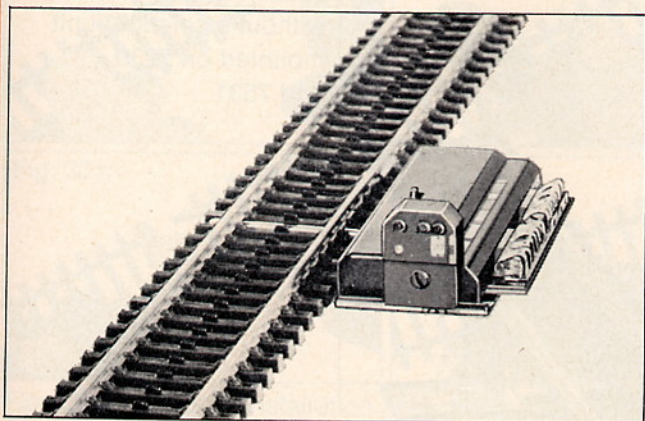
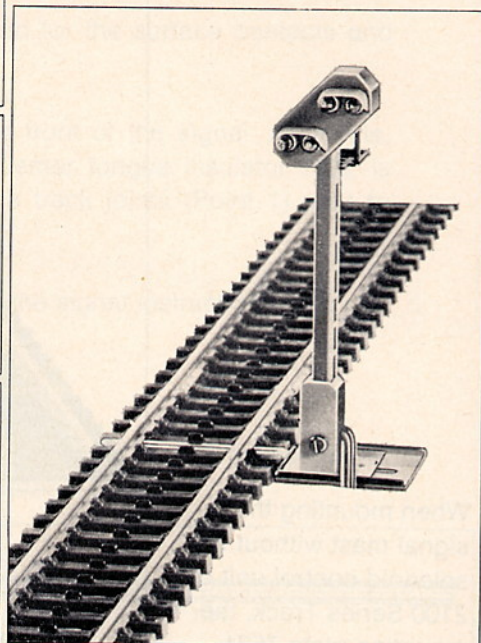


Fig. 24
Dwarf siding
signal
connected
with 7532

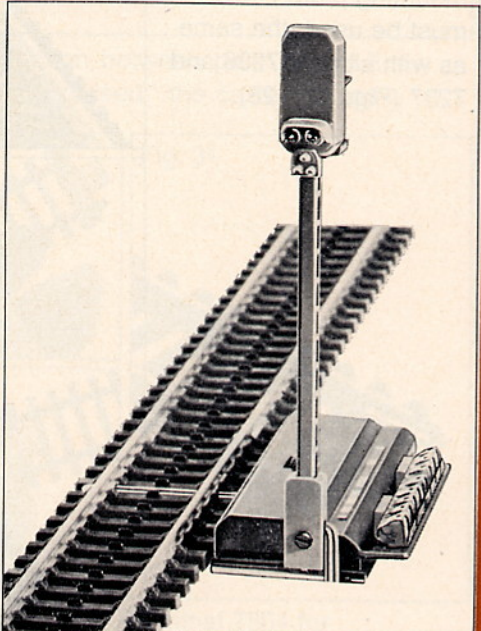


Fig. 25
Home
signal
mounted
on 7532

When mounting the signal mast without the solenoid control unit on 2100 Series Track, the mounting plate 7531 must be used, the same as with signals 7236 and 7237 (Figs. 26–28).

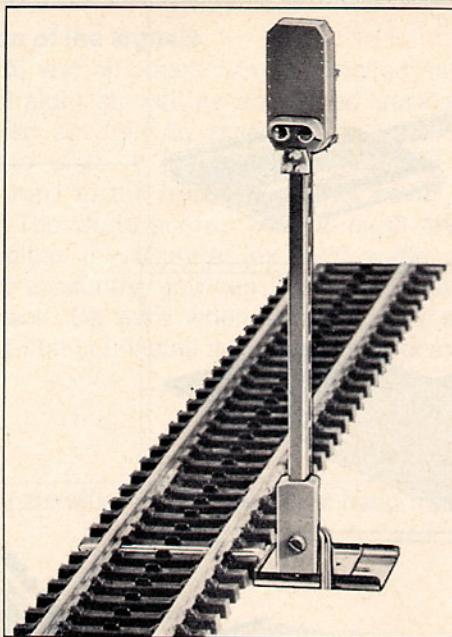


Fig. 26
Home signal without a
solenoid control unit,
mounted on 7230
and 7531

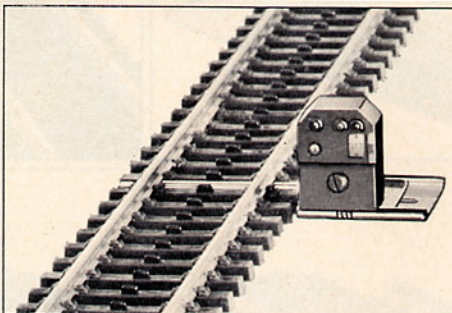


Fig. 27
Dwarf siding signal
without a solenoid
control unit, mounted
on 7230 and 7531

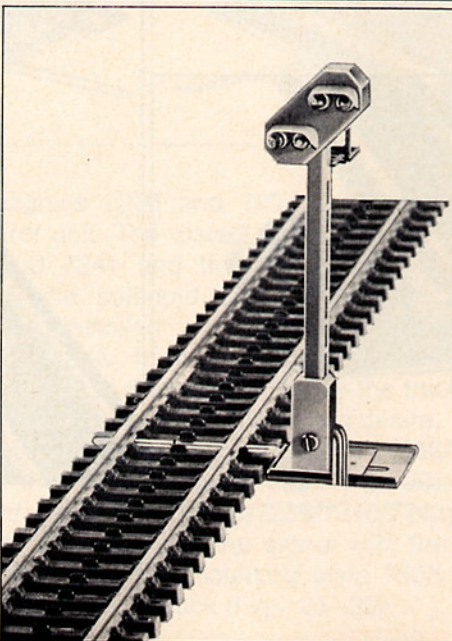


Fig. 28
Distant signal 7238
without a solenoid unit
mounted on 7230
and 7531

The automatic control of the trains by the signals

For automatic control of the trains a small section of the layout in front of the home signal must be electrically insulated from the rest of the track circuit.

The same principle of insulation can be used for the surface contacts and the overhead catenary system.

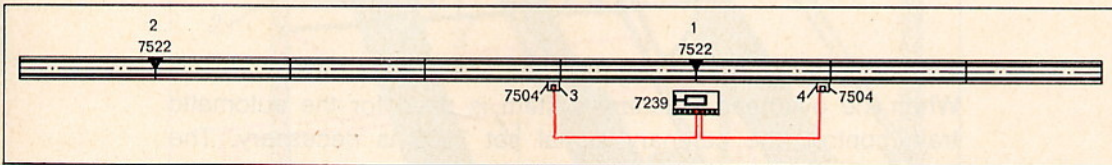
1. Surface contact train operation

Fig. 29 shows the insulated track section in front of the signal. As a rule, its length is that of four track sections. A center tongue insulator 7522 is inserted between the contact tongues of the track joints (Point 1) next to the signal.

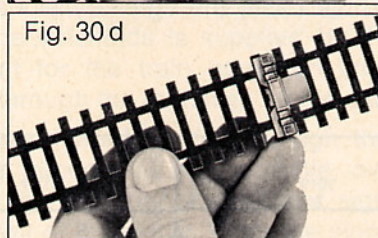
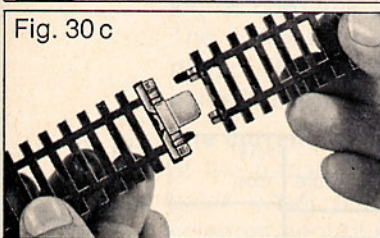
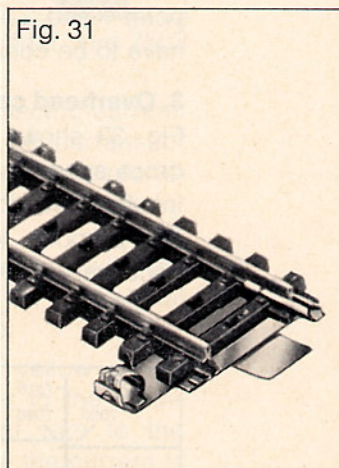
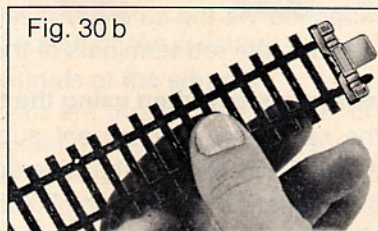
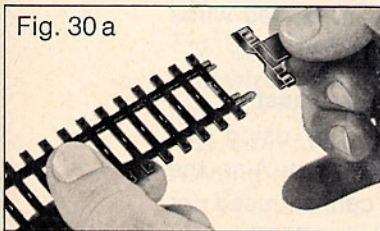
The same is done at Point 2.

For attaching the center tongue insulator see the signal instruction.

Fig. 29: This shows the insulator 7522 installed at points 1 and 2, with the terminals 7504 installed at points 3 and 4 to provide electrical current.



When the signal indicates "Stop", the track section between point 1 and 2 is without any current. When the signal shows "Proceed" the current is fed

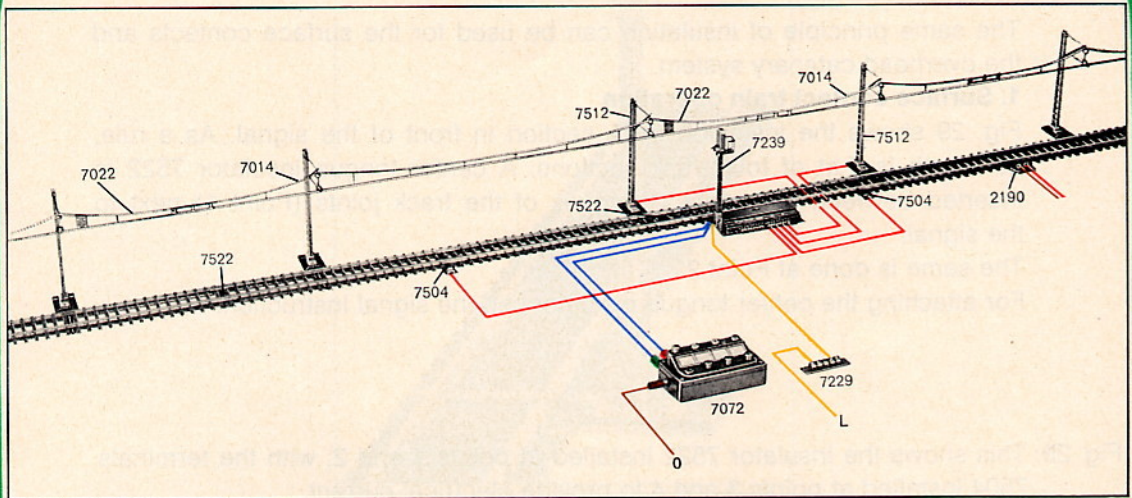


Figs. 30 a – 30 d Installation of center track tongue insulator 7522

Terminal 7504 for center stud contacts

from point 4 through the signal to point 3. By this operation, the track section between point 1 and 2 is supplied with power.

Current supply by surface contact and overhead catenary system
Fig. 32



2. Overhead catenary when using catenary mast 7509

When the overhead catenary system is used for the automatic train control, the catenary signal set 7505 is necessary. The supplied insulator sections for interrupting current 7022 must be connected in the catenary system on point 1 and 2 (Fig. 29). The current for the insulated part of the track section between point 1 and 2 is supplied via the catenary masts. Their red wires have to be connected to the red terminals of the signals.

3. Overhead catenary system when using the tower mast

Fig. 33 shows the overhead wire current supply by using two cross span insulators 7006 to hold the catenary wires. Also the insulator section for interrupting current 7022 can be used for this purpose. In this case, the catenary signal set 7505 is not necessary.

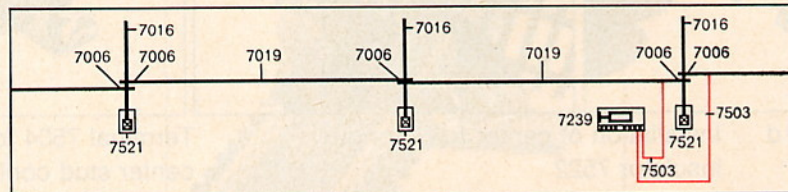


Fig. 33

Overhead wire current interruption by using two cross span insulators 7006 for overhead wire insulation.

Two catenary signal connecting wires 7503 are necessary instead of the catenary signal set 7505. Fig. 34 shows their connection with the catenary system. The current feeder wires (1) must first be connected to the last two red terminals of the signal (see also Fig. 25). These wires are then fed up through the mast (2) and along the cross span (3). The connecting wires are then connected to the wire clips on either side of the insulated catenary sections.

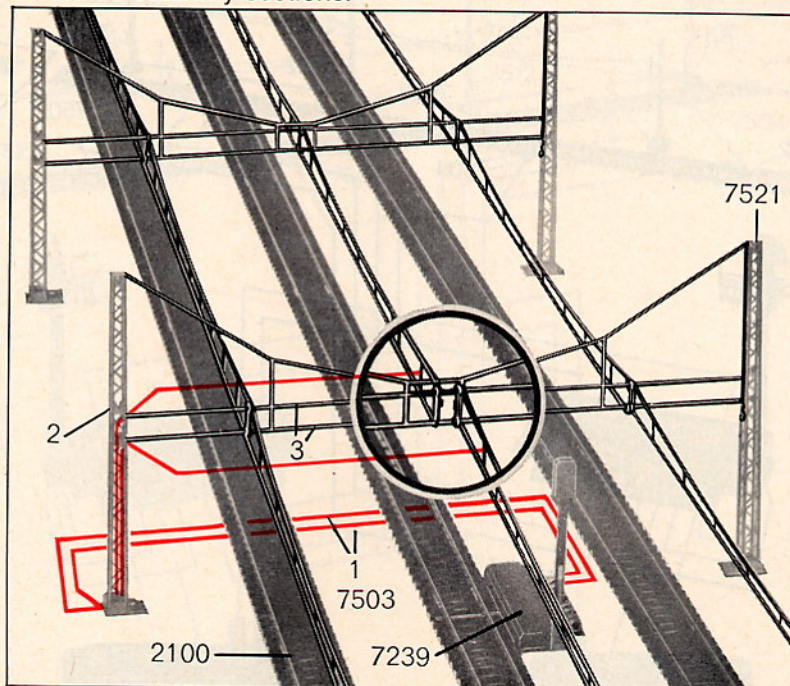


Fig. 34 The connection of the catenary signal feeder wire 7503

The wires and terminals of the signals

On every signal there are three distinct types of electric current: The current for operating the electric solenoid, the current for running the train and the current for the lights. The corresponding connections are demonstrated for signal 7239 in Fig. 8, for signal 7240 in Fig. 9 and for signal 7241 in Fig. 10.

The current for the solenoids is supplied by the wire with the plugs. The current for the train operation and for the signal lights is supplied through the terminals on the side.

The current for the solenoids is fed through the yellow socket of the transformer through the yellow cable, over to the distributor panel and then through the yellow signal wire to the solenoid control unit of the signal. From the signal the current is fed back through a blue cable with a red, green or sometime orange plug to the switch panel. From the switch panel the "ground" current is supplied by a brown cable via the distributor panel to the brown socket of the transformer. The purpose of this current source is to operate the electric solenoid and thereby change the functions of the signal.

Fig. 35 a Path of current when signal set for "Stop"

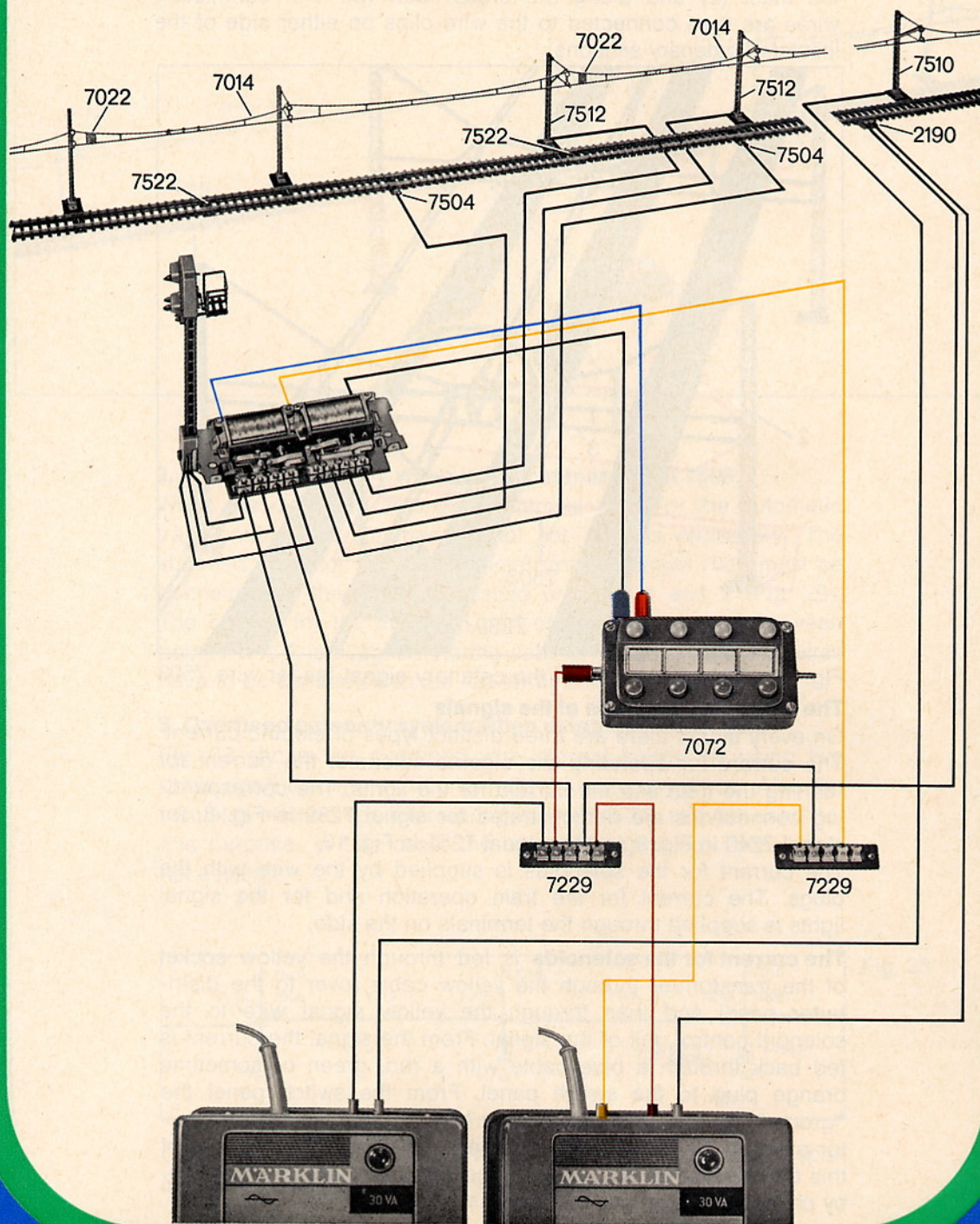
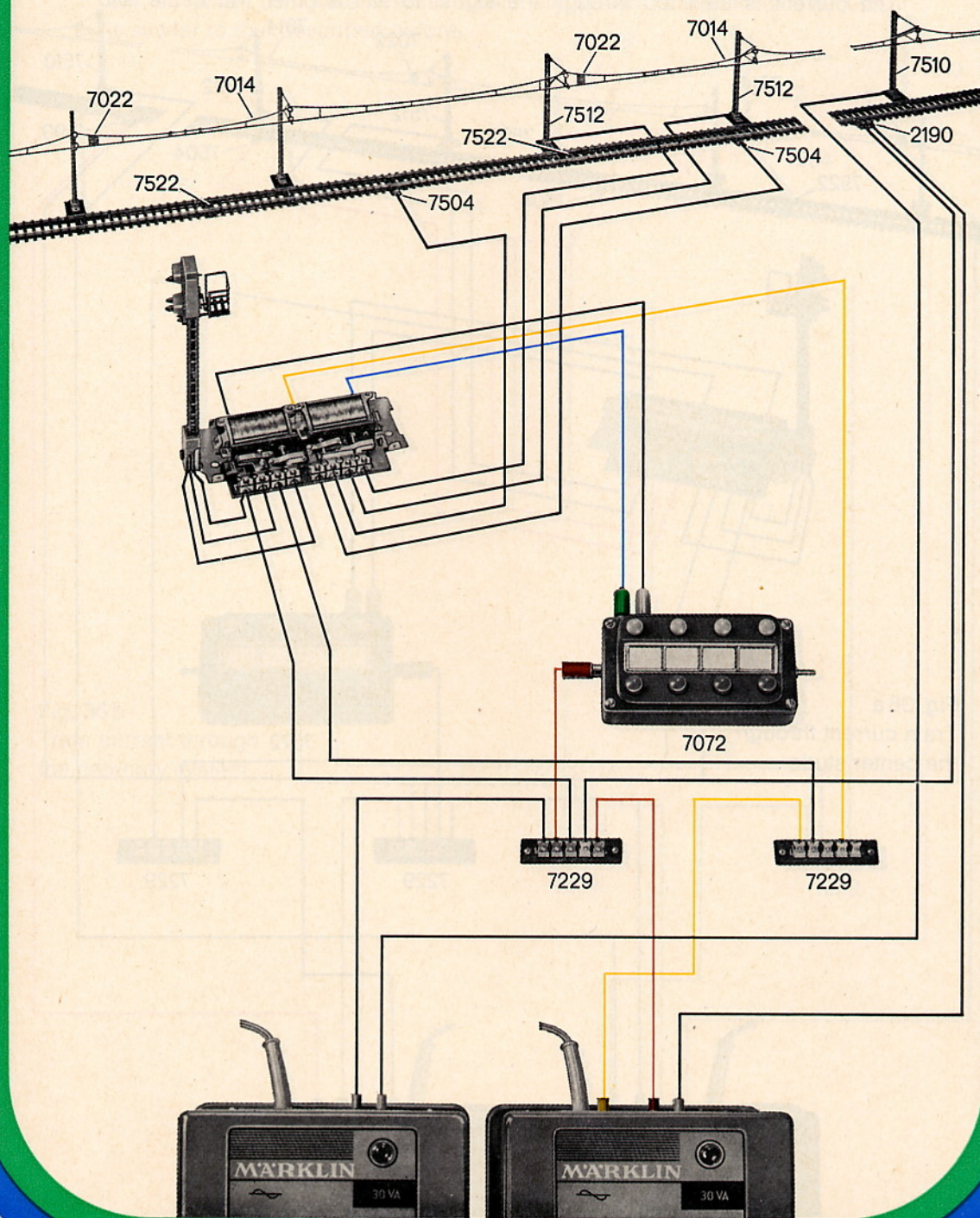


Fig. 35 b Path of current when signal set for "Proceed"



The current for running the trains is supplied by the red socket on the transformer. When used for surface contact through the studs the current is fed from the transformer via a red feeder cable to the red terminal of the feeder track, and from there to the stud contacts in the center of the track. The current is then fed via another red cable to the terminals of the signal. The current is then fed through the signal to still another red cable and

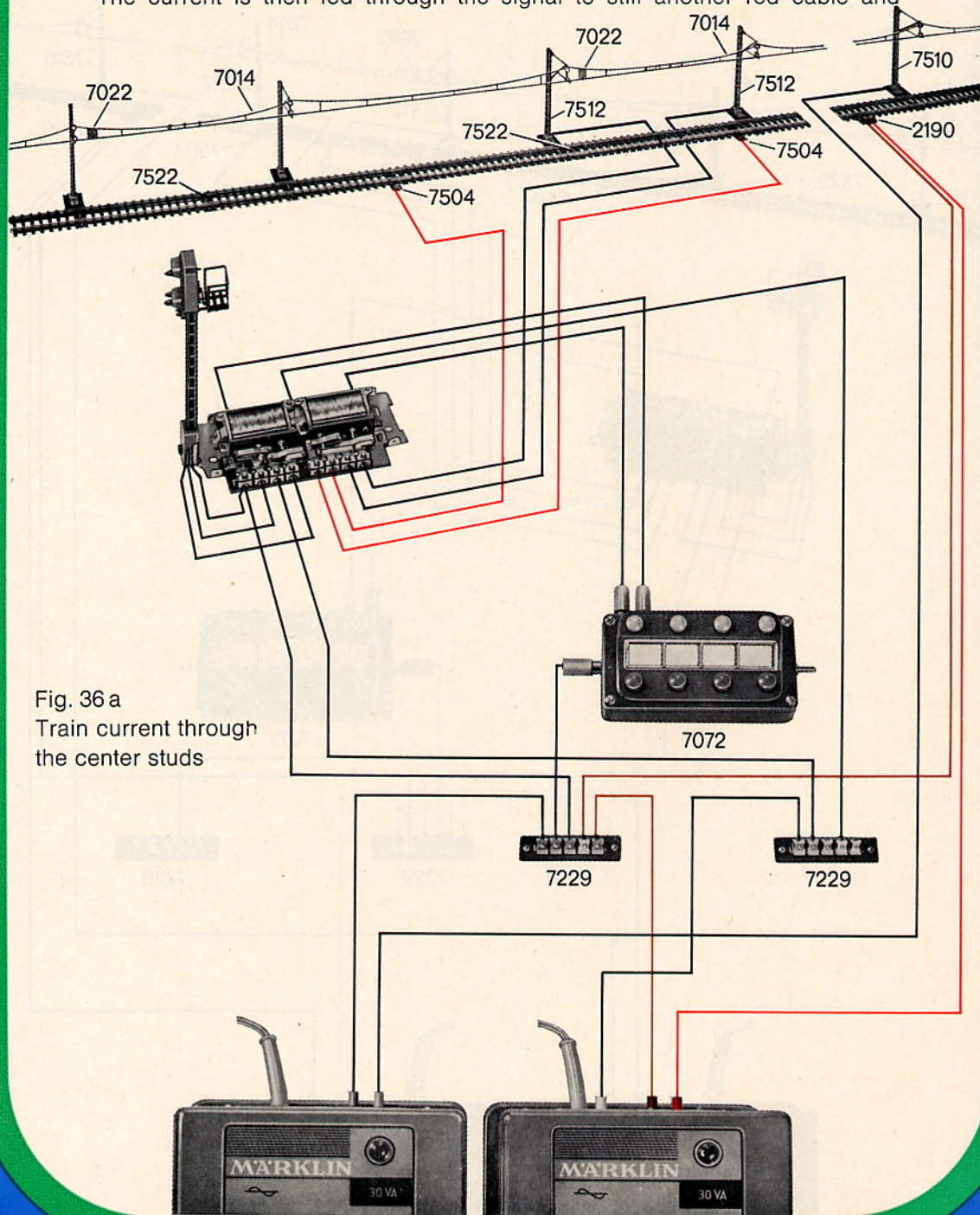


Fig. 36 a
Train current through
the center studs

back to the second track terminal in the insulated section of the track and then to the stud contacts in the center of the track. The stud contacts then feed the current to the pick up shoe on the bottom of the locomotive. The current is then fed through the wheels of the locomotive of the running rails and finally back through the brown wire to the brown socket of the transformer. When using the overhead catenary system, the path of the current is similar to that described before.

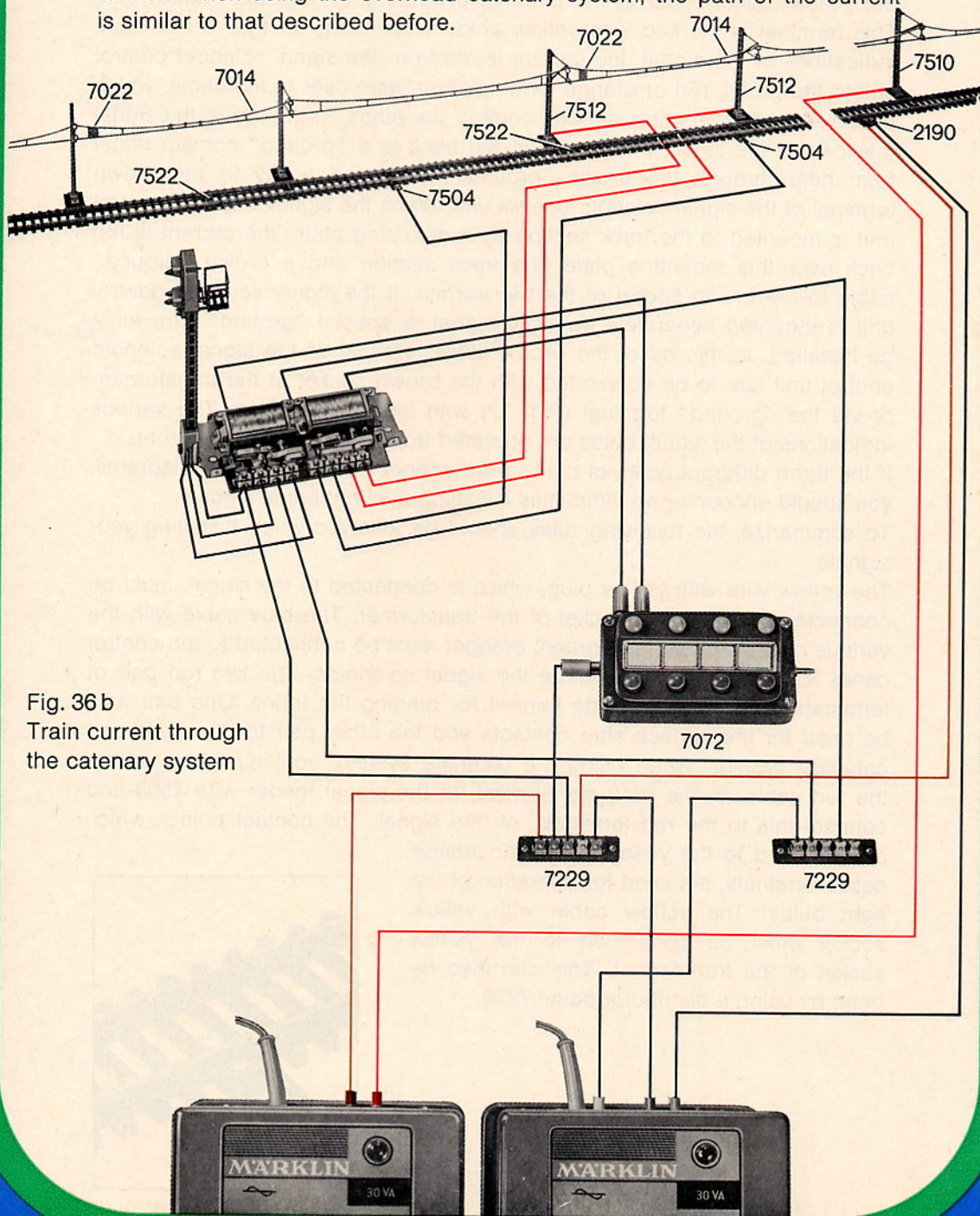


Fig. 36 b
Train current through
the catenary system

The red cable is supplied with a special metal connector for use with 5100 and 5200 Series Track. When used with 2100 Series Track this metal clip must be cut off and the insulation removed from the end of the wire.

The current for the signal lights is supplied by the yellow socket of the transformer, running through the yellow cable via the distributor panel and the yellow signal cable to the terminal of the signal solenoid control unit. This terminal is marked with yellow color. Depending on the various light indications of the signal, the current is fed from the signal solenoid control unit to the green, red or orange terminal, from here over to the cable, which is corresponding in color with the color of the bulbs on the top of the signal mast. From the signal the current is fed back to a "ground" contact plate, from here through the brown "ground" cable and finally to the brown terminal of the signal solenoid control unit. When the signal solenoid control unit is mounted to the track section by a mounting plate, the current is fed back over this mounting plate, the track section and a brown "ground" cable to the brown socket of the transformer. If the signal solenoid control unit is mounted separately from the signal, a special "ground" wire must be installed. In this case, the brown cable terminal of the signal solenoid control unit has to be connected with the brown socket of the transformer, or via the "ground" terminal (Fig. 37) with the track section. The various indications of the signal bulbs are operated from this signal light current.

If the three different types of current are connected as per these diagrams, you should encounter no difficulties installing the light home signals.

To summarize, the following rules should be followed when installing your signals:

The yellow wire with yellow plug, which is connected to the signal, must be connected to the yellow socket of the transformer. The blue cable with the various colored plugs (red, green, orange) must be connected to the control panel 7072. These wires operate the signal solenoids. The two red pair of terminals are used to provide current for running the trains. One pair may be used for the surface stud contacts and the other pair for the overhead catenary system. When using the catenary system, you must use either the red cable on the 7512 signal mast, or the signal feeder wire 7503 and connect this to the red terminals, on the signal. The contact points, which are attached to the yellow, green or orange cable terminals, are used for operation of the light bulbs. The yellow cable with yellow socket must be connected to the yellow socket of the transformer. This can also be done by using a distributor panel 7229.

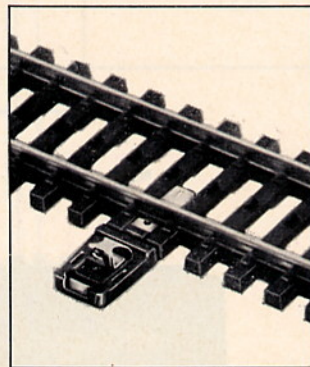


Fig. 37 Ground terminal 7500 ►

The colored cable, which comes from the signal mast, must be connected to the like colored terminals of the signal control unit. If you mount the signal control unit away from the track, the brown wire must be connected to a "ground" terminal.

Fig. 38 a Signal indicating "Stop"

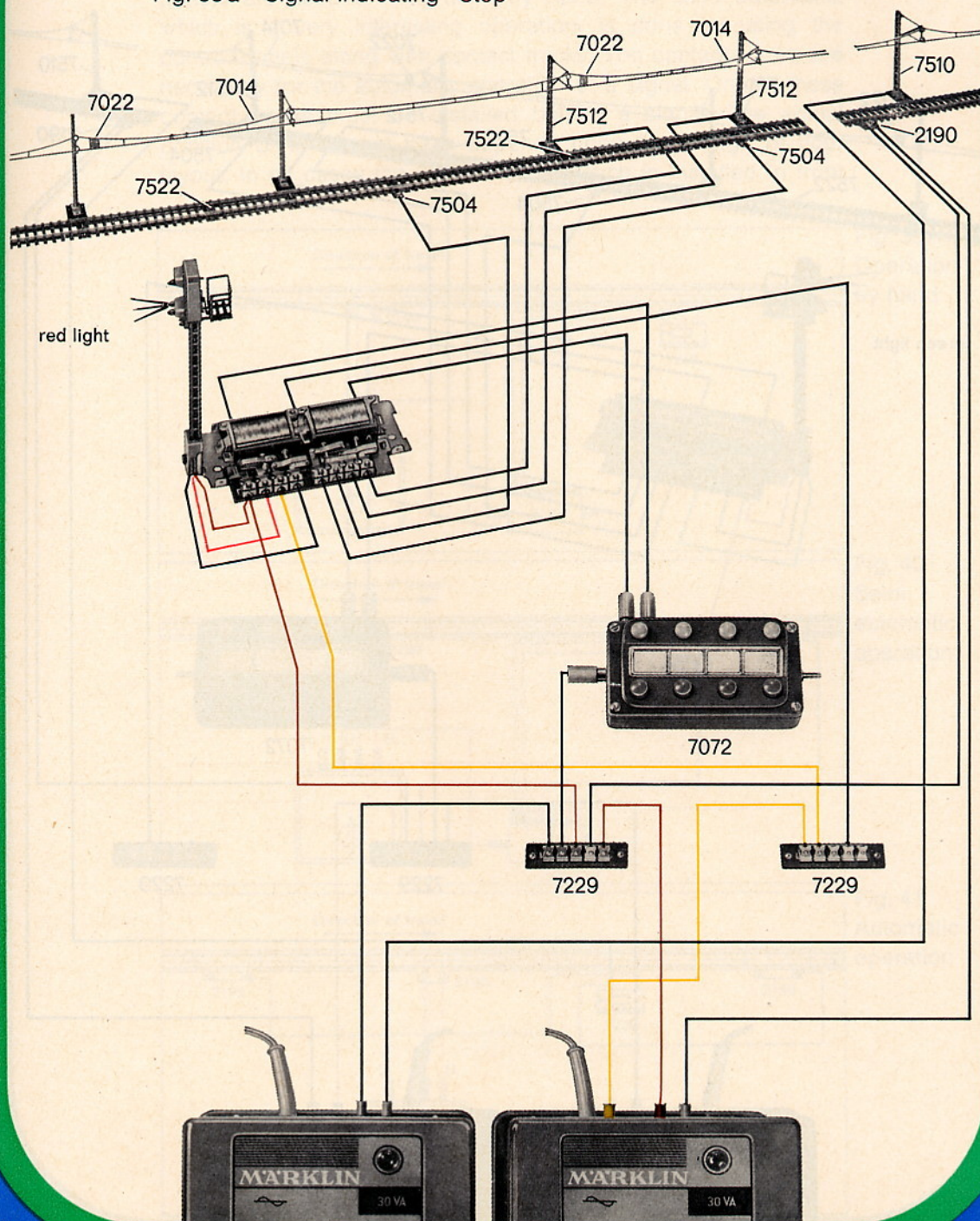
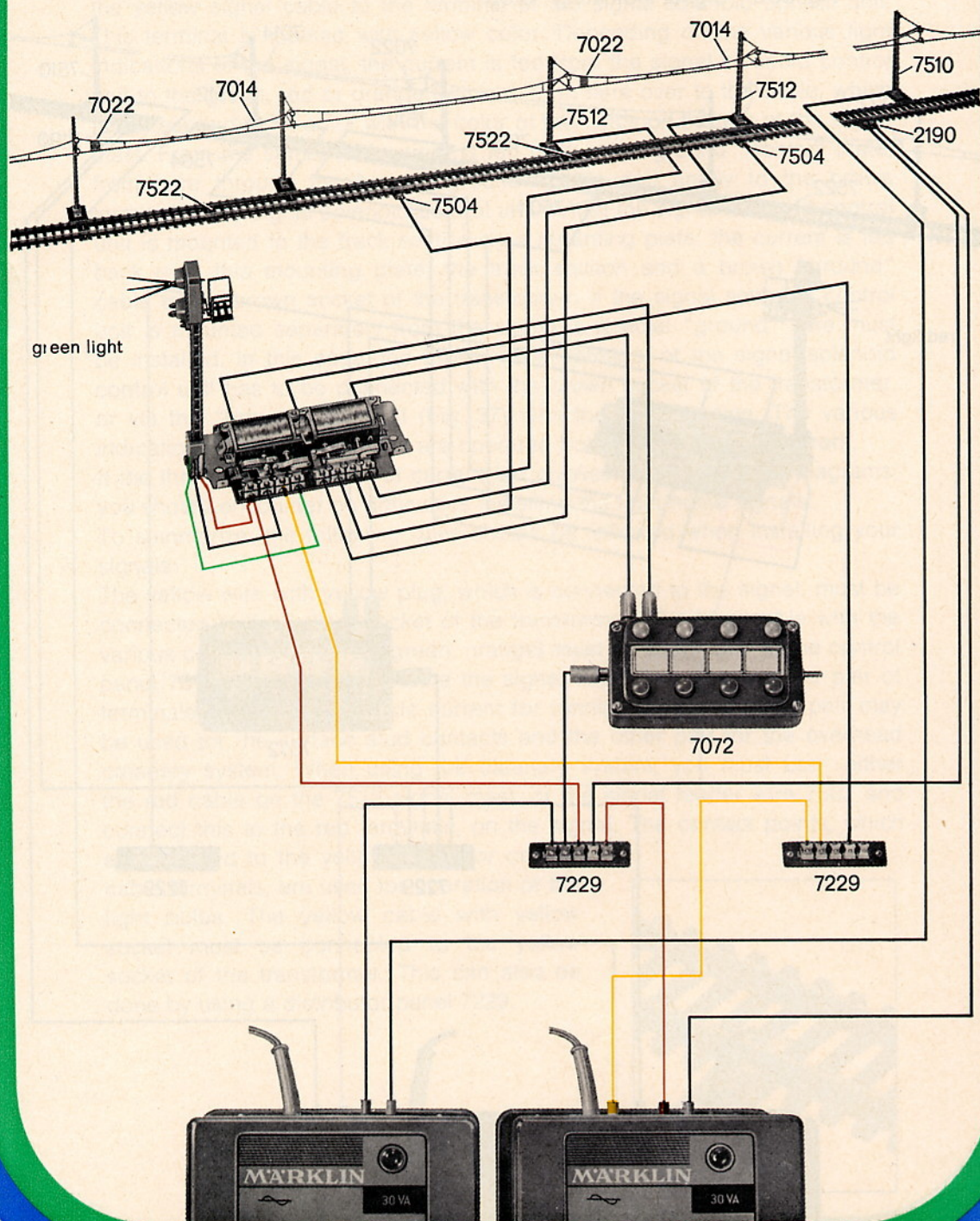


Fig. 38 b Signal indicating "Proceed"



The operation of the home signal

The signals can be operated with either the control panel 7072, or the contact track 2129/2139 and 2199. They can be connected for hand operation (Fig. 39), hand and automatic operation (Fig. 40) or fully automatic operation (Fig. 41). The control panels are used for operation by hand. The semi automatic, which is a very interesting operation, is done by using the control panels along with contact tracks. The contact tracks are necessary for the automatic operation of a signal. One of these contact tracks must be installed behind a signal. The actual position of a contact track depends upon the design of your layout. In all cases the contact track, which is installed in front

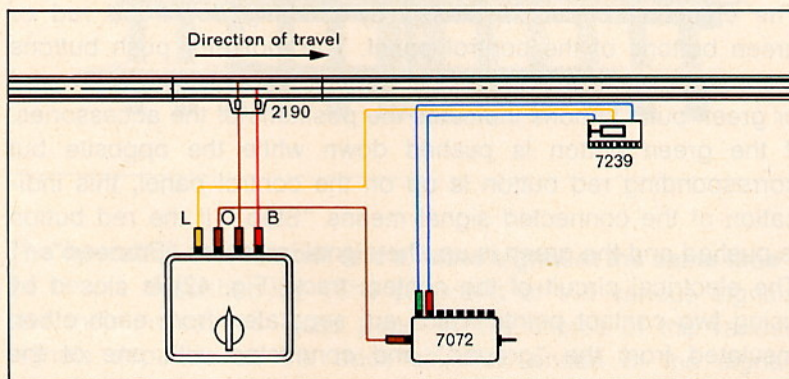


Fig. 39
Operation
by hand

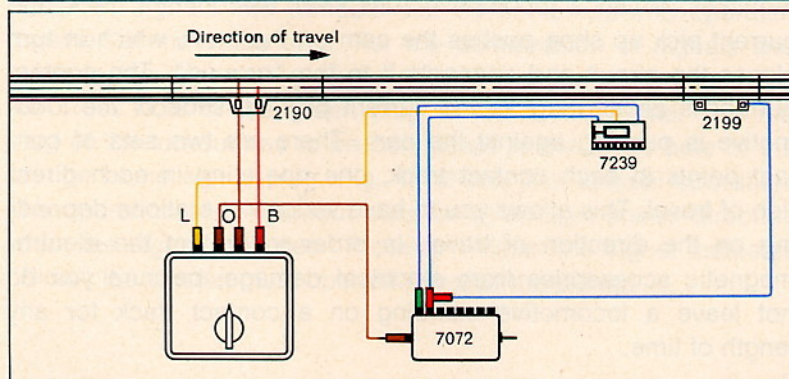


Fig. 40
Semi
automatic
operation

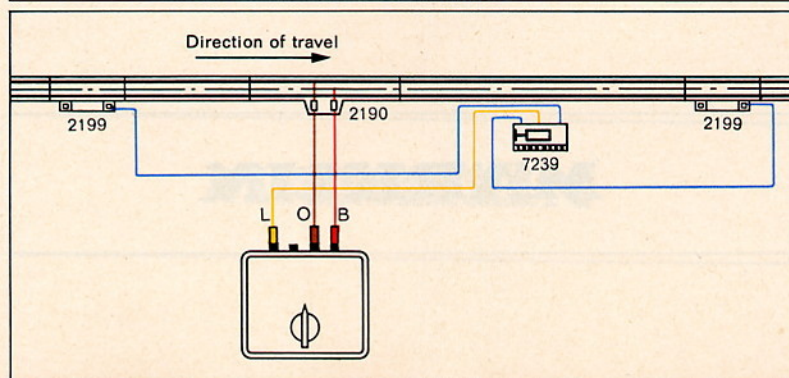


Fig. 41
Automatic
operation

of the signal must be in front of the insulated section 7522 of the track.

The most suitable position for the first contact track can be determined by experimentation. The other contact track, which is installed behind the signal should be placed about one length of a train away from the signal.

The purposes of the control panels and the contact track

The control units for operation of the MÄRKLIN electromagnetic accessories (signals, turnouts etc.) supply electric current impulse to the electromagnetic accessories either by hand operation of the control panel, or by the train actuating the contact track.

The electrical circuit is closed by pushing down the red or green buttons of the control panel. The indicator push buttons are connected to a common circuit. The arrangement of the red or green push buttons indicates the positions of the accessories. If the green button is pushed down while the opposite but corresponding red button is up on the control panel, this indication of the connected signal means "Stop". If the red button is pushed and the green is up, the signal indicates "Proceed".

The electrical circuit of the contact track (Fig. 42) is closed by using two contact points which are separated from each other, insulated from the "ground" and connected with one of the terminals. When a locomotive runs over the contact track, the current pick up shoe pushes the cam on the track, which in turn closes the circuit and connects it to the "ground". The contact current is on as long as the current pick up shoe of the locomotive is pushing against the cam. There are two sets of contact points in each contact track, one operating in each direction of travel. This allows you to have various operations depending on the direction of travel. In order to protect the electromagnetic accessories from electrical damage, be sure you do not leave a locomotive standing on a contact track for any length of time.

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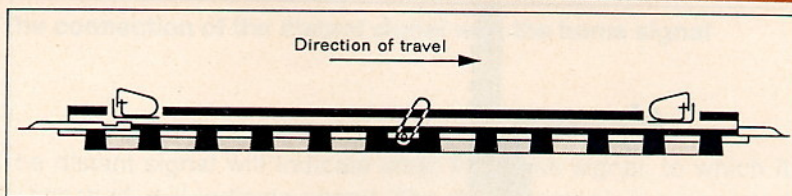


Fig. 42 a

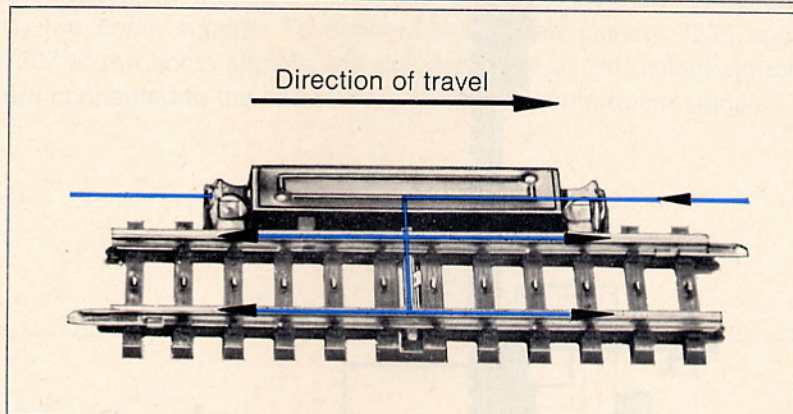
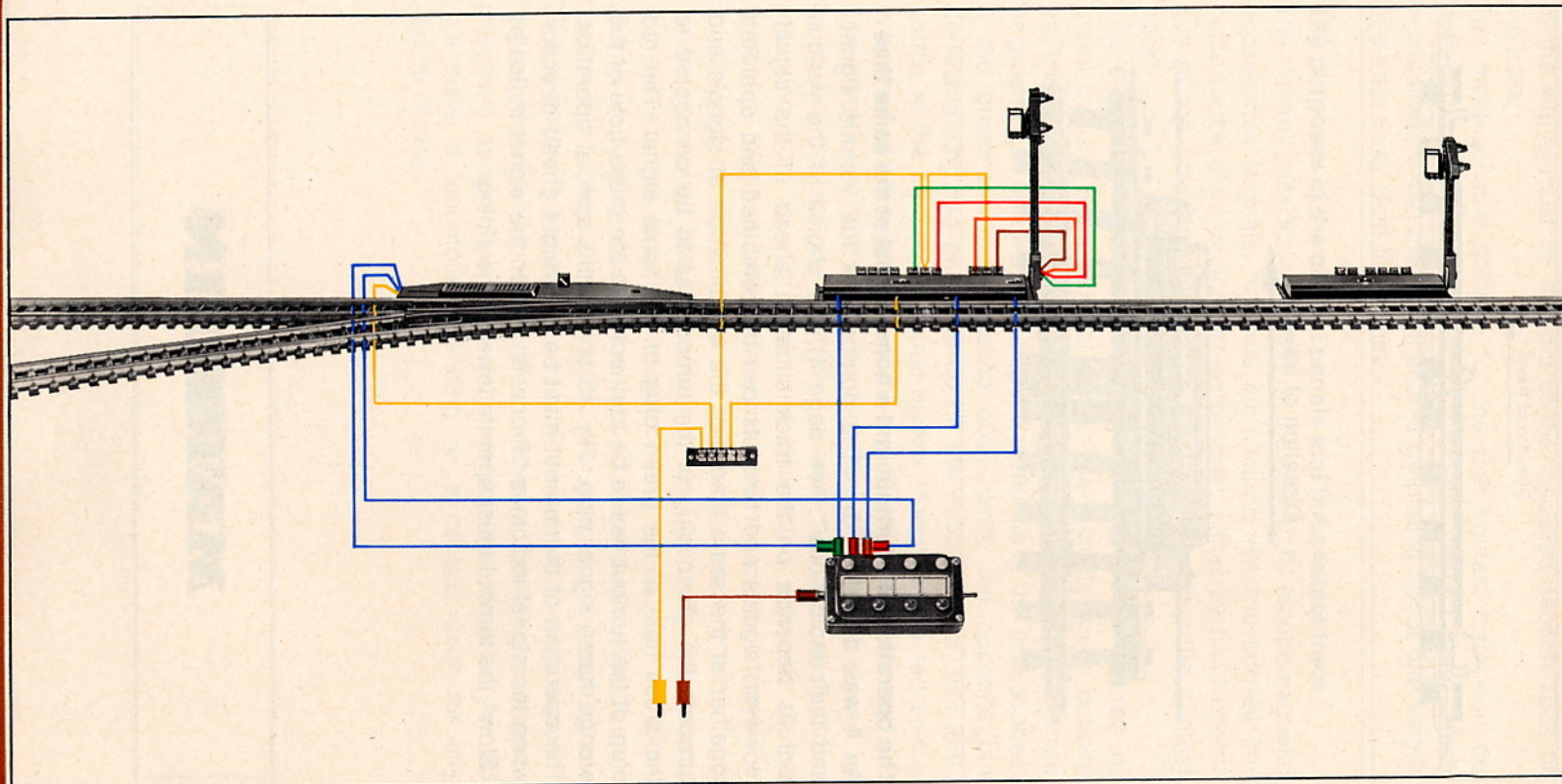


Fig. 42 b
Contact
track
2199

The operation of a turnout and a home signal at the same time

As it was described by "The purposes of the various signals and their indications" (see page 4), the choice of the various signals depends on the track situation ahead of the signal. However, signals and turnouts can be combined and operated together at the same time. For the combination of signals and turnouts the green plug of the turnout has to be connected to the cross hole of the green plug of the home signal. The red plug of the turnout has to be connected to the cross hole of the orange home signal plug. Fig. 43 shows this special operation. The operation of the turnout must be in straight ahead direction when the signal indicates "Proceed". When the signal indicates "Slow" the turnout must operate towards the siding.

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The operation of a turnout and a home signal at the same time

Fig. 43

The connection of the distant signal with the home signal

The distant signal will indicate what the home signal, to which it is attached, will indicate ahead. The distant signals are operated by the home signals. To connect the distant signals 7236 and 7237 to the home signals, the colored wires of the distant signal are connected to the like colored terminals of the home signal.

Fig. 44

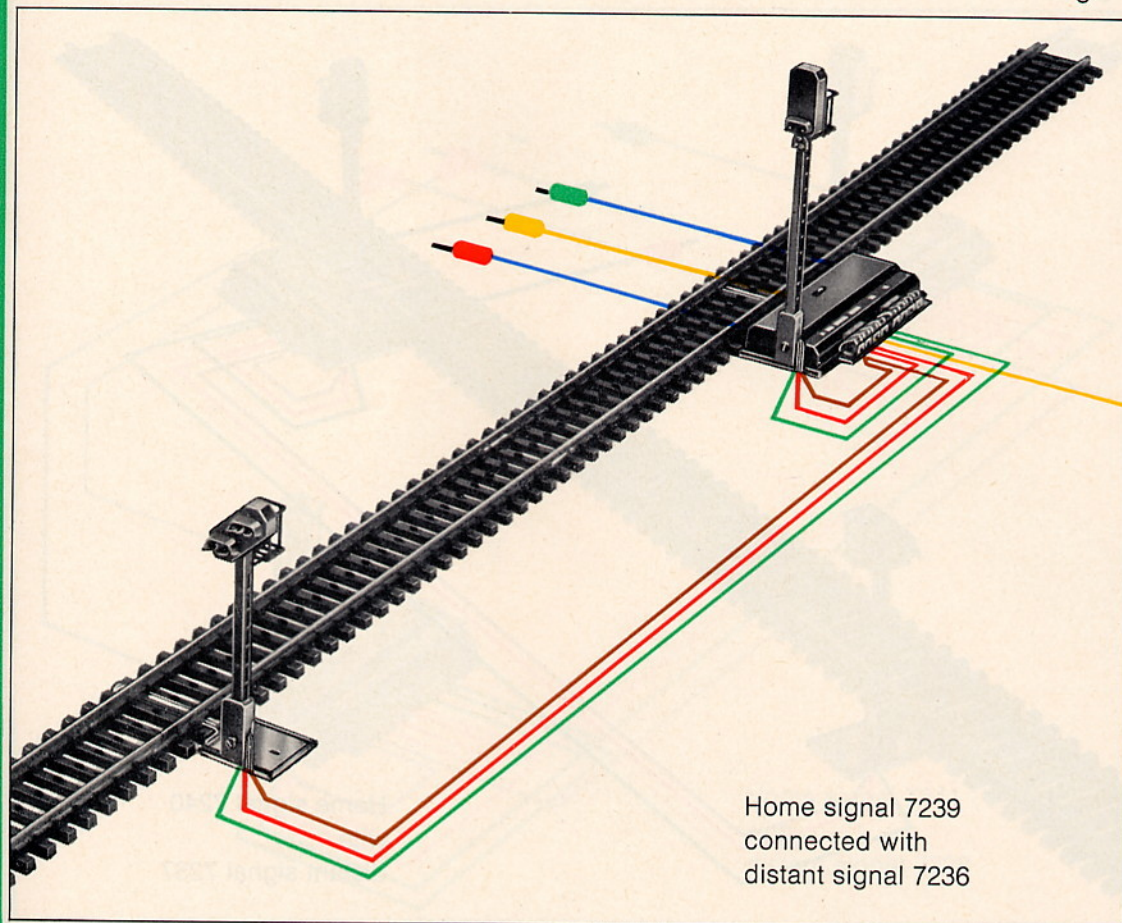
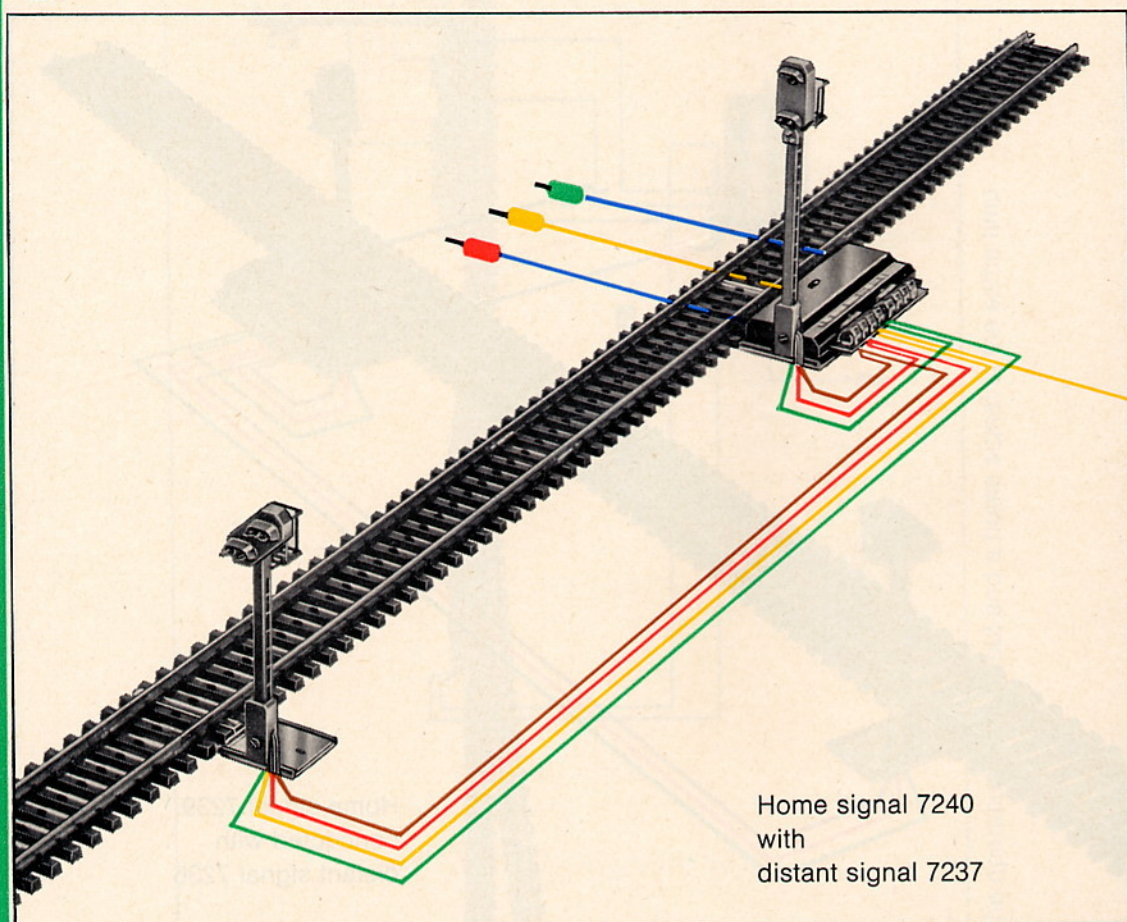
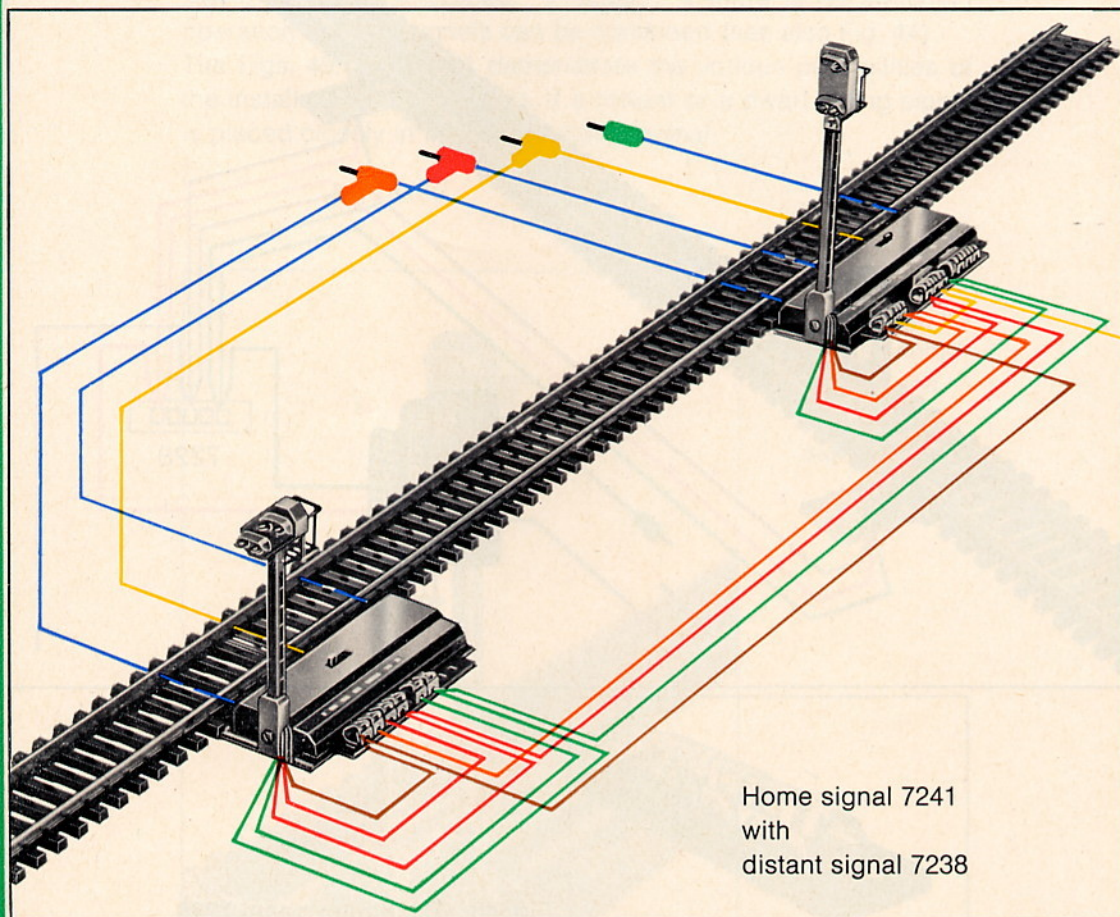


Fig. 45



The distant signal 7238 is equipped with a solenoid control unit in order to correspond to the indications of the home signal 7241. The yellow and blue cables with the yellow, red and orange plugs, which are mounted on the signal solenoid control unit, must be connected to the plugs of the home signal. The color cables, which come from the signal mast, must be connected with the signal solenoid control unit in the same position as the color strip on the cover case indicates. In addition to the other color indication, the color strip shows two small green and red marks. The two green terminals must be connected with the two green wires, the two red terminals in the same way with the red wires. The remaining wires must be connected to the like colored cables of the home signal.

Fig. 46



The orange and brown cables of the home signal and the distant signal must be connected in the same manner.

When the home signal is mounted separately from the signal solenoid control unit (Fig. 47), you may want to connect the distant signal with the home signal by using the distributor panel 7228 (Fig. 48). The various terminals of this panel must be connected with the terminals of the signal solenoid control unit.

Fig. 47

Home signal 7239 without
signal solenoid control unit,
and distant signal 7236
in connection with
distributor panel 7228

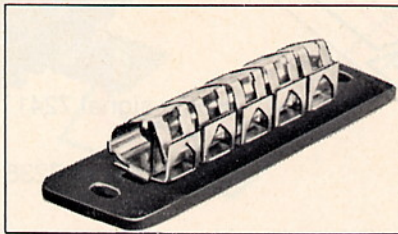
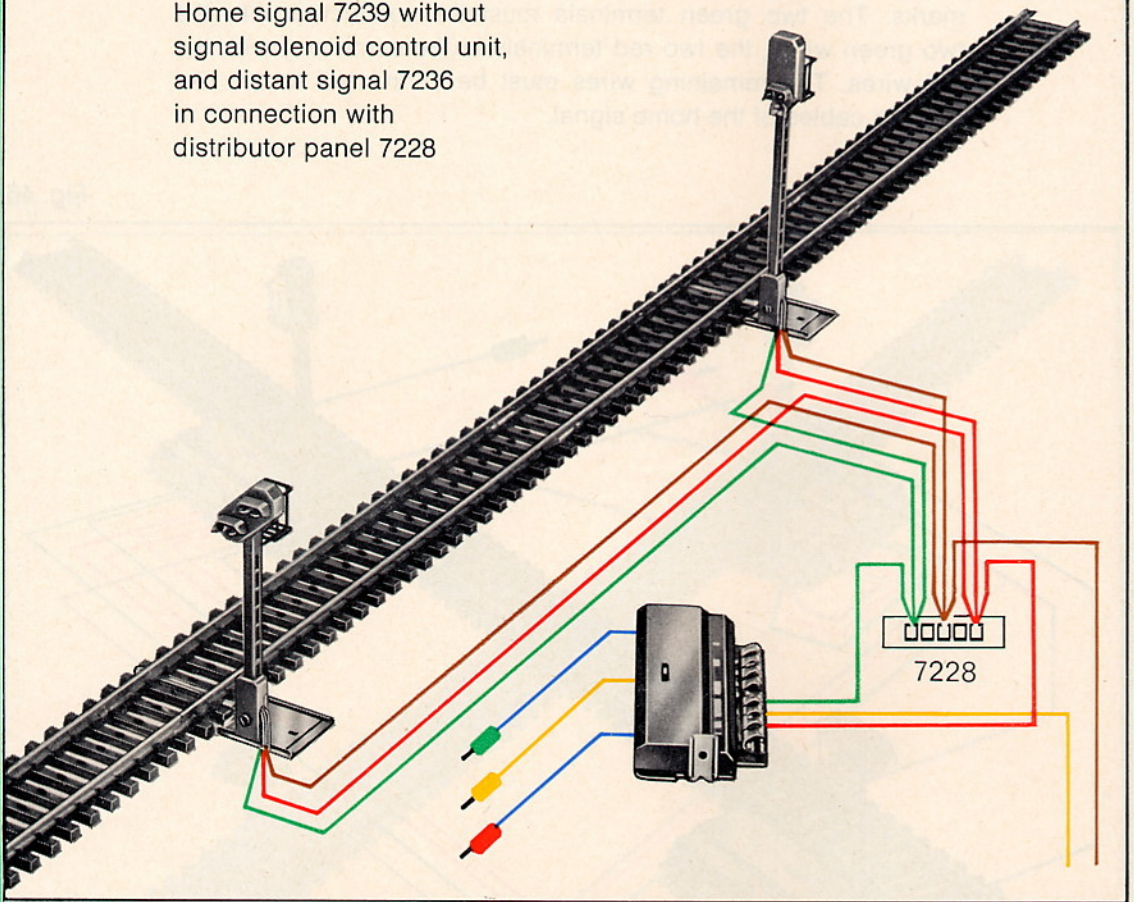


Fig. 48 Distributor panel 7228

The installation of the dwarf siding signal 7242

This dwarf siding signal is equipped with the same signal solenoid control unit as the home signal 7239. The installation and the operation is therefore the same. If the dwarf siding signal is placed closely in front of the home signal, attention must be paid, that the train operation control should be indicated only by the dwarf siding signal. In this case, only the pair of red terminals of the dwarf siding signal have to be connected to the track or the overhead catenary wire. The dwarf siding signal must indicate "Proceed" when the train is coming out, as well as when the train only is switching. When the train is switching, the home signal indicates "Stop", the dwarf siding signal indicates "Proceed". Before the train can proceed, the home signal indication has to be changed to "proceed" and afterwards the dwarf siding signal must indicate "Proceed". If there is no switching operation, the two signals can be combined (see also Fig. 44). The Figs. 49, 50 and 51 demonstrate the various possibilities of the installation of the signals, if a distant or a dwarf siding signal is placed closely in front of the home signal.

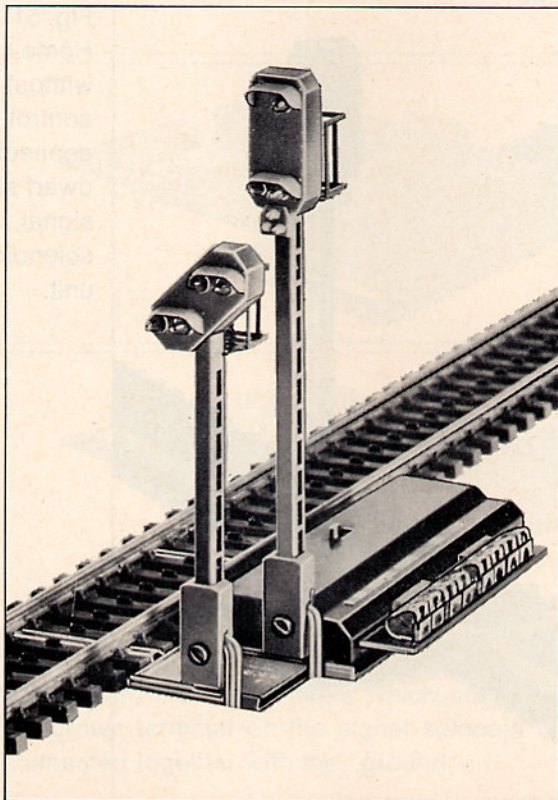


Fig. 49
Home signal,
with solenoid
control unit,
and distant
signal

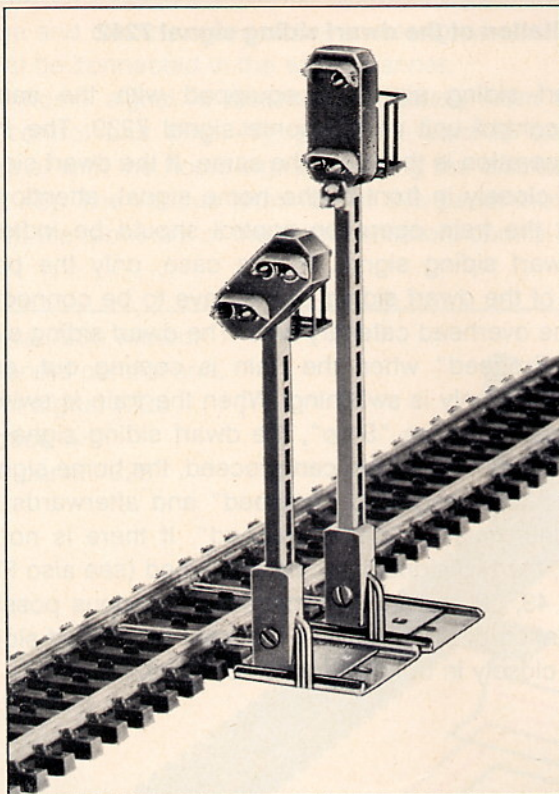


Fig. 50
Home signal,
without solenoid
control unit,
connected with
distant signal

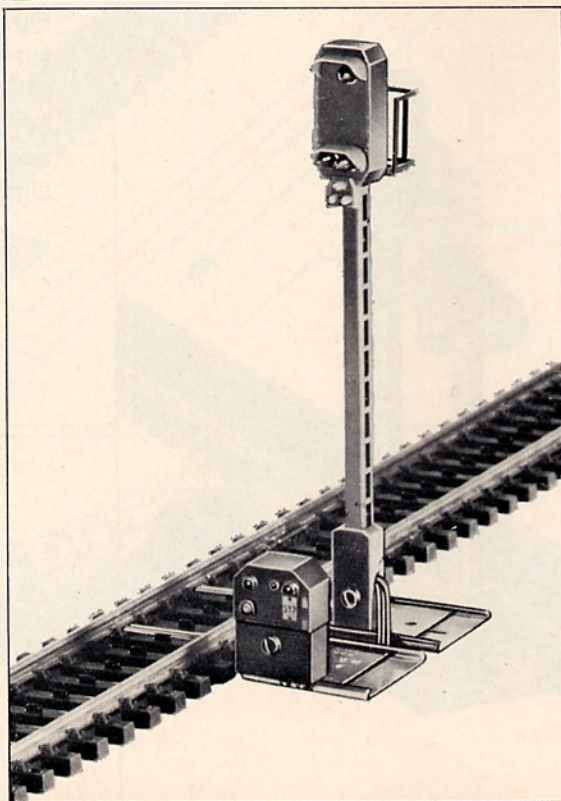


Fig. 51
Home signal,
without solenoid
control unit,
connected with a
dwarf siding
signal, without
solenoid control
unit.

The MÄRKLIN Light Signals when used with the 5100/5200 Series Track

You will encounter no problems when using the new light signals with 5100/5200 Series Track. However these signals must be mounted on the track with different mounting plates.

The following mounting plates must be used:

Distant signals	7236 and 7237	with 7231
Distant signal	7238	with 7232
Home signals	7239 and 7240	with 7232
Home signal	7241	with 7233
Dwarf siding signal	7242	with 7232

If signals with the signal solenoid control unit 7238, 7239, 7240, 7241 and 7242 are installed separately from this solenoid control unit, the mounting plate 7231 must be used for the distant signal 7236 and 7237 also.

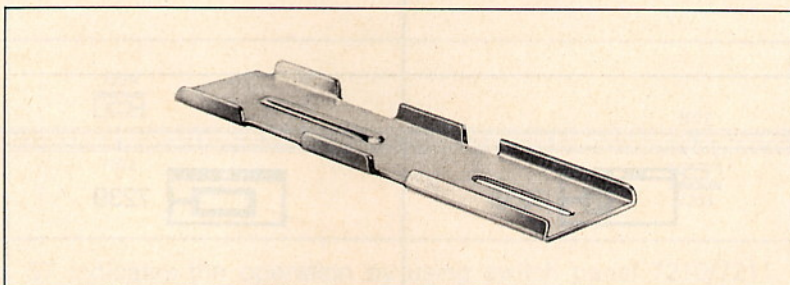


Fig. 52
Mounting
plate 7231

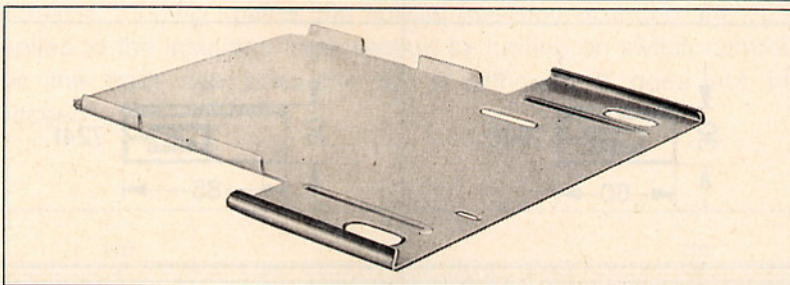


Fig. 53
Mounting
plate 7232

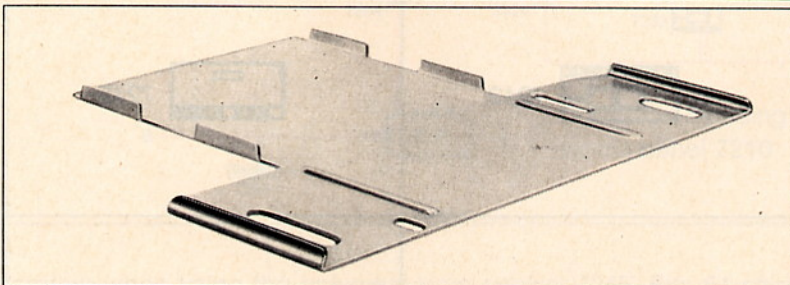


Fig. 54
Mounting
plate 7233

If the signals are installed beside the track without "ground" connection, the brown cable which comes out of the mast and the brown terminal on the signal solenoid control unit must be connected together with the "ground".

The symbols for the signals

In order to demonstrate the various signals and their accessories on the following track layout plans, special symbols are used for this purpose. The other symbols which are used beside these are shown in the MÄRKLIN TRACK PLAN MANUAL 0379.

Whenever the signals 7238-42 are shown without any solenoid control unit, as a symbol it means, that the signal are installed separately from the solenoid control unit.

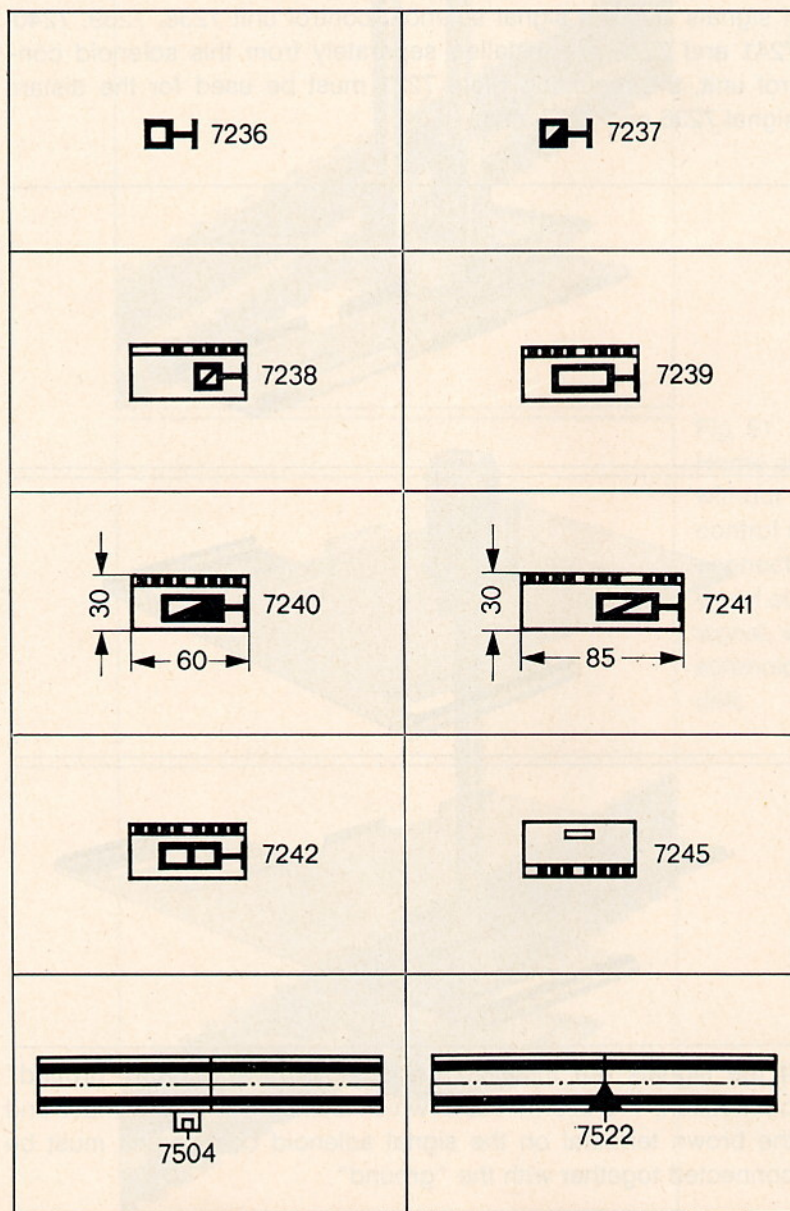


Fig. 55
Symbols for
the signals
and
accessories

Operation of single track when using it for two direction traffic

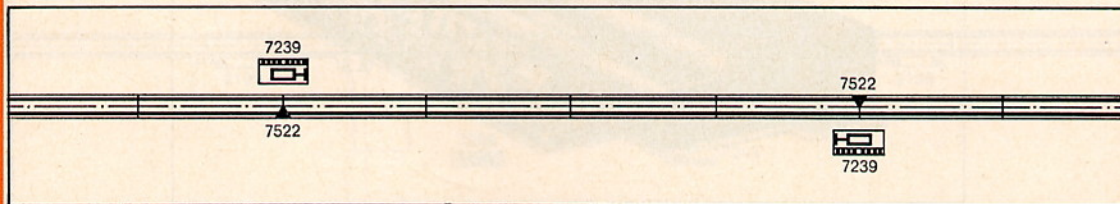
In actual practice the trains operating for right hand traffic are controlled only by the signals on the right side of the track. However, because of the special operation of the MÄRKLIN Home signals, the train will also be stopped by signals installed on the left hand side of the track whenever the signals indicate "Stop".

This disadvantage can be overcome by the following methods:

1. Fig. 56 shows the installation of two signals along a single track, each signal operating in one direction only. Both signals must share a common insulated track section. You can operate these signals by contact track as was demonstrated in Figs. 40 and 41, Pages 23.

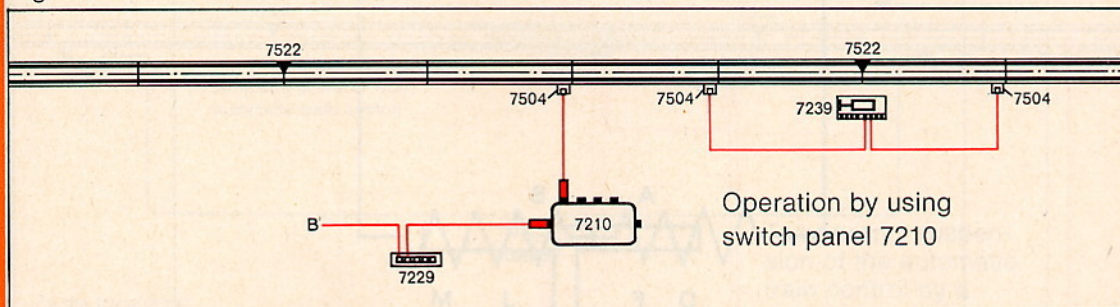
This type of operation will allow a train to pass a signal on the right hand side of the track which indicates "Proceed", even though the left hand signal indicates "Stop".

Fig. 56



2. Fig. 57 indicates the operation by using switch panel 7210/7211. When the train is running against the normal direction of traffic, the current is supplied to the insulated track section by turning on switch control 7210. Thus the train can pass the signal although it does not indicate "Proceed".

Fig. 57



3. Operation when using the universal train control 7245. Fig. 61 shows the arrangement of the signal in connection with the universal train control. The operation of the signal is only indicating for one direction of the single track.

The universal train control unit 7245

The universal train control unit (Fig. 58) has the same construction as the signal solenoid control unit. The control unit of 7245 is equipped with contact points to provide on-off current and reverse current. It is possible therefore to provide many various operating functions. The color strip indicates which terminals are to be connected for any given operation.

Universal train control unit 7245

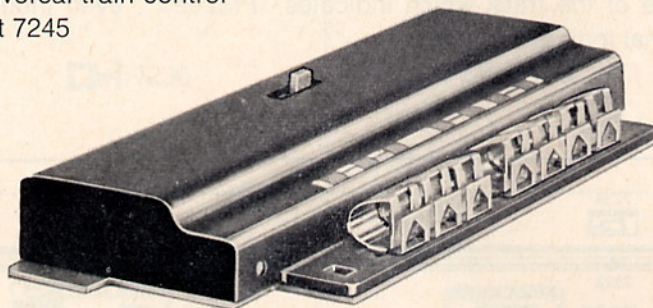


Fig. 58

The electrical function of the universal train control unit

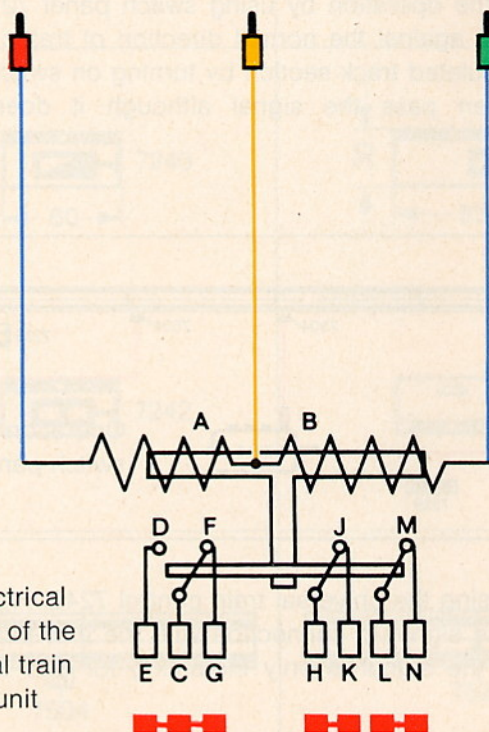


Fig. 59

Basic Circuit I:

The turning on and off of accessories (Fig. 60) by operation of the coils A or B (see Fig. 59). The electrical current travels along the path H-J-K or L-M-N. For example: The lights in a station can be turned on by the running train, before it enters the station and then turned off again when the train leaves the station. For instance (Fig. 61): The automatic operation of the train on a single track can be suspended temporarily for another train travelling in the opposite direction.

The signal can be installed as usual, as it will have no effect on the operation of the universal train control.

Fig. 60

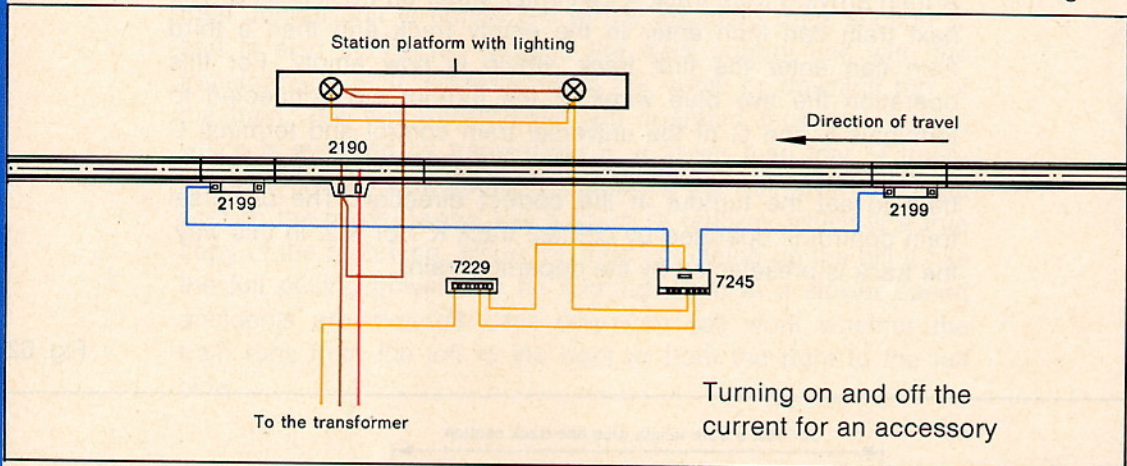
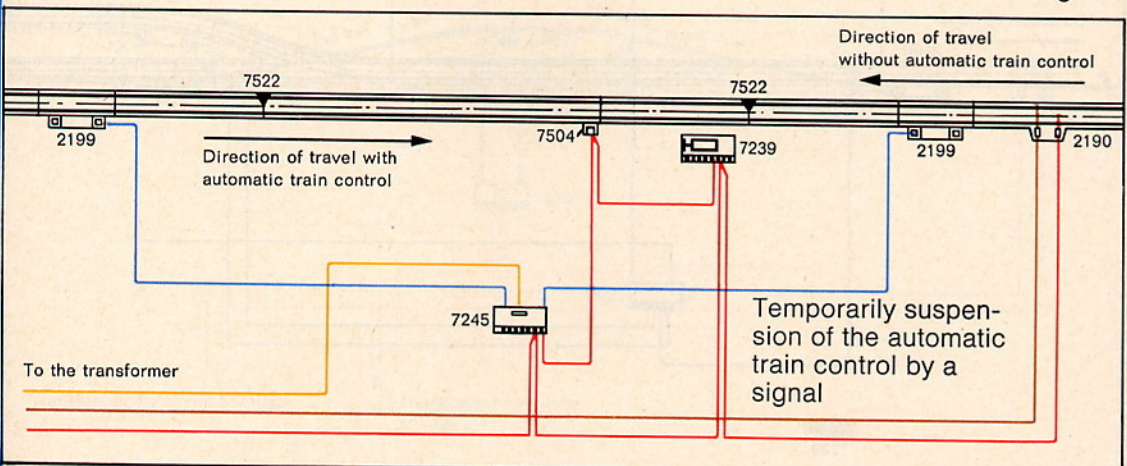


Fig. 61



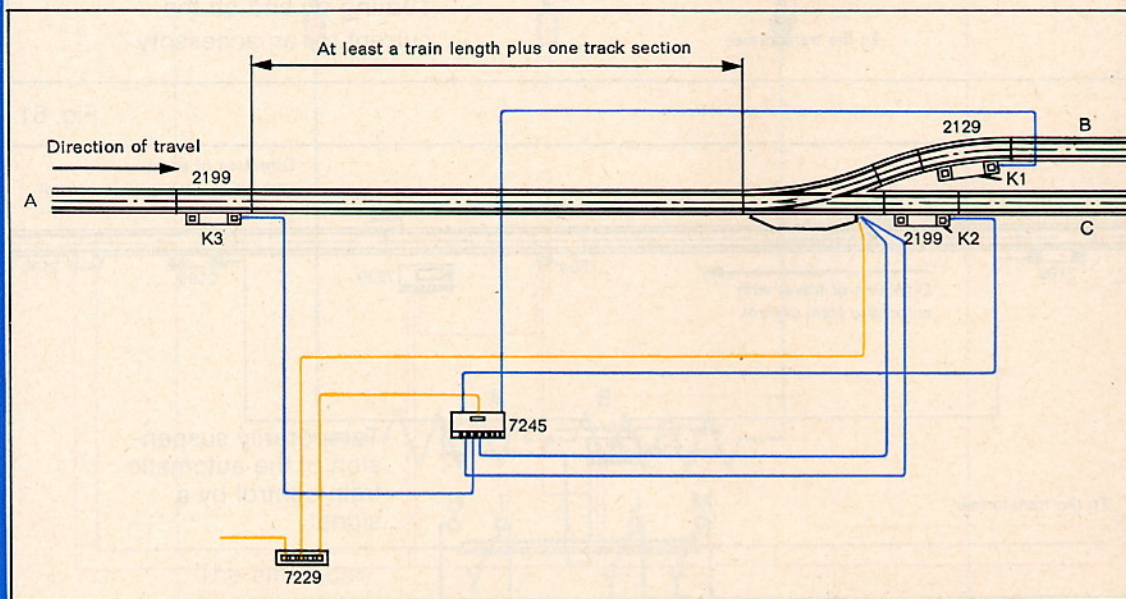
When the overhead catenary system is used along the same section of track, the current is fed to the catenary wires by using the second set of terminals (L-N).

Basic Circuit II:

Alternate change over of two accessories, current supplies from one current source. Alternate operation through solenoid coils A or B. Changing the current from C-D-E to C-F-G with the current input through C and current output through E or G (see Fig. 59).

A train arriving from track A can enter either on track B or C. The next train can then enter in the empty track and then a third train can enter the first track, which is now empty. For this operation the two blue wires of the turnout are connected to terminals E and G of the universal train control and terminal C is connected to contact track K 3. This will allow the arriving train to set the turnout in the correct direction. The universal train control is operated by contact track K 1 or K 2. In this way, the track is preselected by the departing train.

Fig. 62



Automatically changing the station track for arriving trains by preselection when using a universal train control unit.

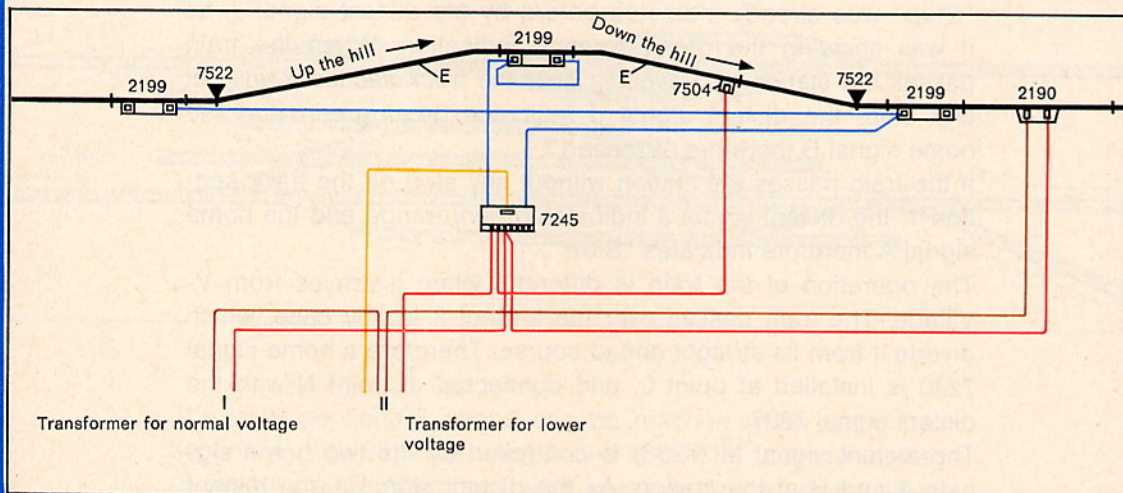
Basic Circuit III:

Alternate change over of two sources of current to one electrical accessory. Alternate operation by solenoids A or B. Transfer of the current to E-D-C or G-F-C with input at E or G and output at C (see Fig. 59).

Example (Fig. 63): When the train is operating over a hill, the train will pick up the full current voltage for the uphill trip and the lower voltage for the run down the hill.

The current for the train operation is supplied to the universal train control unit from the transformer I via a terminal E and from the transformer II via a terminal G. The terminal C of the train control unit is connected to the insulated track section E, and is also connected through the train control unit with the transformer I or II, corresponding the uphill or downhill trip of the train. The two transformers are operated thus the voltage, which is supplied by transformer II, is lower than that of transformer I. By this slow speed operation of the train over a hillside section the model layout has a touch of realism, which is a true copy of the prototype. When the train is running up the hill it has the full pulling power and by running down in a slower speed accidents are avoided. This operation will work whether the train runs from the left to the right or from the right to the left side.

Fig. 63



Hillside trip in various directions, full voltage up the hill, lower voltage down the hill

Examples for the application of the signals

Track layout and signal equipment of a station

Fig. 64

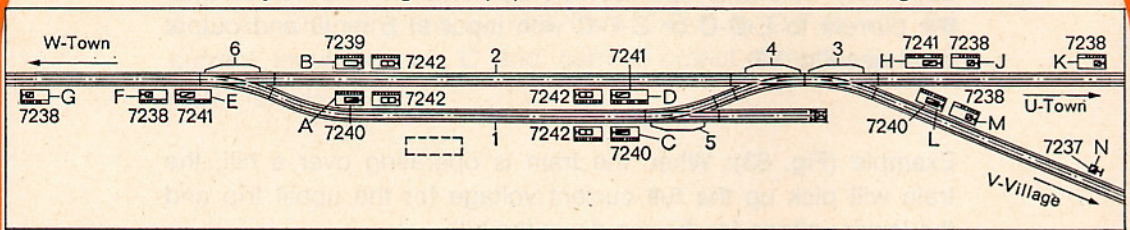


Fig. 64 shows a section of a station. The installation of various signals are described: A train, which is arriving from U-Town, will first pass the distant signal K (7238). This signal indicates

1. if the train has to stop at the home signal H (7241),
2. or if the train can pass this signal H at full speed,
3. or it has to reduce its speed while passing the home signal H.

The home signal H will not indicate "Slow", when the train arrives on the track section 2, as he can travel straight ahead without passing a turnout. The home signal indicates in this case "Proceed" (see also Fig. 6d). The train has to reduce its speed when it travels over turnout 4 and 5 in order to enter into track section 1. The distant signal J (7238), which is installed beside the home signal H, is attached to the home signal A (7240) and B (7239). The two home signals A and B are installed in the station area.

If the train has to stop at the station, the home signals A or B, which are placed at the exit of the station, indicate "Stop". This "Stop" was already indicated before by the distant signal J, as it was showing the orange/orange indication. When the train passes the station by travelling over the track section 2 without any stop, the distant signal J indicates green/green and the home signal B therefore "Proceed".

If the train passes the station without any stop on the track section 1, the distant signal J indicates green/orange and the home signal A therefore indicates "Slow".

The operation of the train is different, when it arrives from V-Village. The train passes over the turnout 3 in any case, which diverts it from its straight ahead course. Therefore a home signal 7240 is installed at point L, and connected at point N with the distant signal 7237.

The distant signal M (7238) is controlled by the two home signals A and B at the station. As the distant signal J, the distant signal M can indicate "Stop, signal ahead", "Proceed, signal ahead" and "Slow, signal ahead".

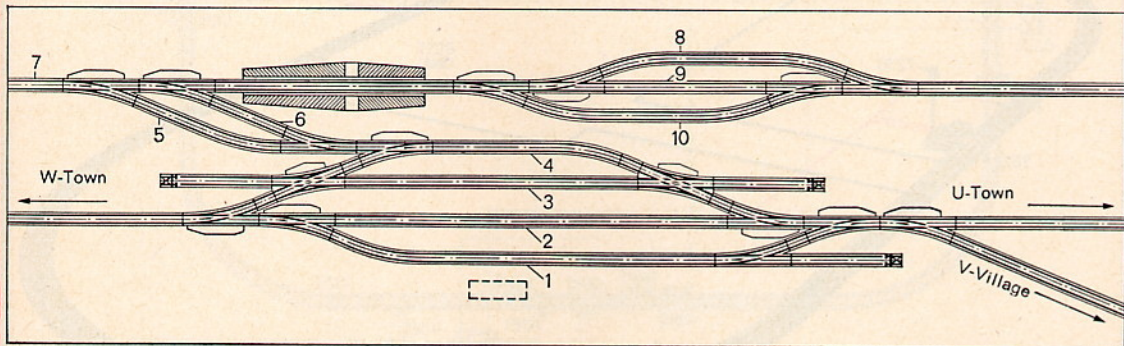
The signals E, F and G are operating for all trains, which will arrive from W-Town. The function of these signals is similar as the signals H, J and K.

Trains, which leave on track 1 in the direction of W-Town, have to pass the turnout 6, and trains which are leaving the direction of U-Town and V-Village have to pass the turnouts 5, 4, and 3. Two home signals 7240 at point A and C are responsible for their operation in this direction.

Trains, which leave the station for the W-Town direction will use the straight ahead track 2. At point B a home signal 7239 is operating for these trains. Trains, which leave the station on track 2 for the V-Village direction have to pass turnout 3. A home signal 7241 is installed at point D in order to control their travel operation. Dwarf siding signals are installed in front of all home signals, which are placed along the station exit tracks. They protect the station section when switching operations inside the station area are in progress. For example, when a locomotive is exchanged after the train has stopped in the station, the locomotive can move away only if the dwarf siding signal indicates "Proceed", and the home signal indicates "Stop". Fig. 65 shows how a station layout can be enlarged with other track sections by using various signals.

Extended track layout

Fig. 65



The track sections 5 and 6 can be reached when using track section 4 (Fig. 65). The track 5 and 6 can be used for storage of freight trains. After the freight cars are recorded, the freight cars can be pulled on track 7 and pushed backward over the ramp. The uncoupled freight cars can be pushed onto track 8, 9 or 10.

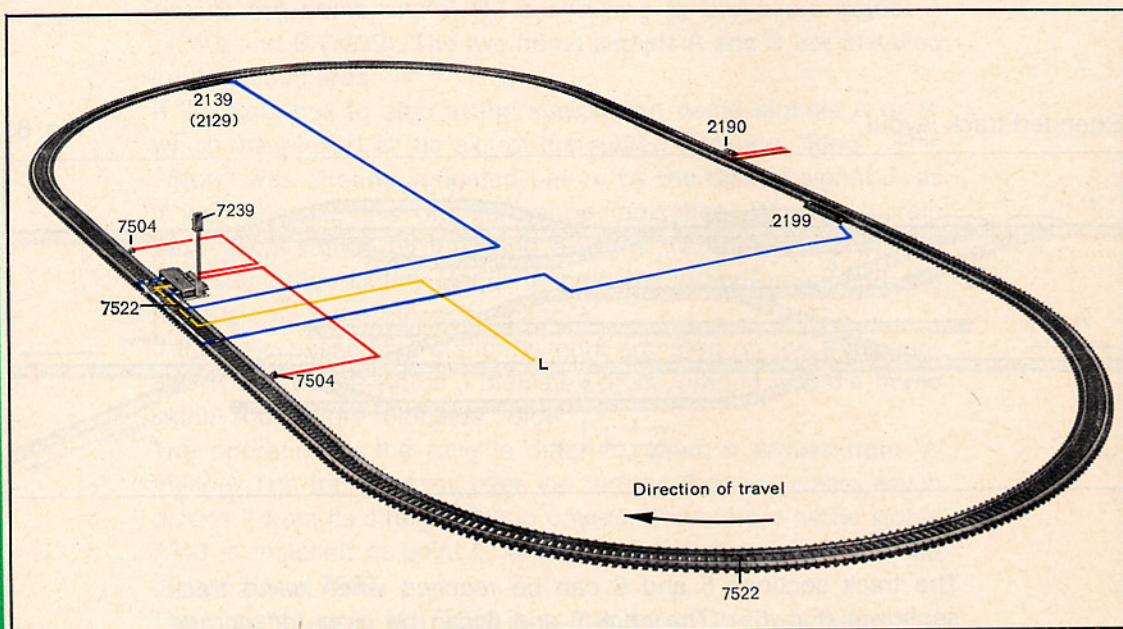
The automatic train control systems

The track sections of the prototype are divided into various block sections in order to protect the track sections, which are situated between two stations. At the beginning of each block section a home signal is installed. This signal can indicate a free block only when the preceding train has completely passed the entire block section, and the following signal indicates "Stop". This system ensures that the home signal can indicate "Proceed" only when there is no danger present.

By using the MÄRKLIN Home signals the operation of your model railroad can be protected in the same manner and many trains can be operated at the same time. The signal indications are controlled automatically by the trains and allow a safe model railroad operation.

Operation with an automatic block signal system

Fig. 66



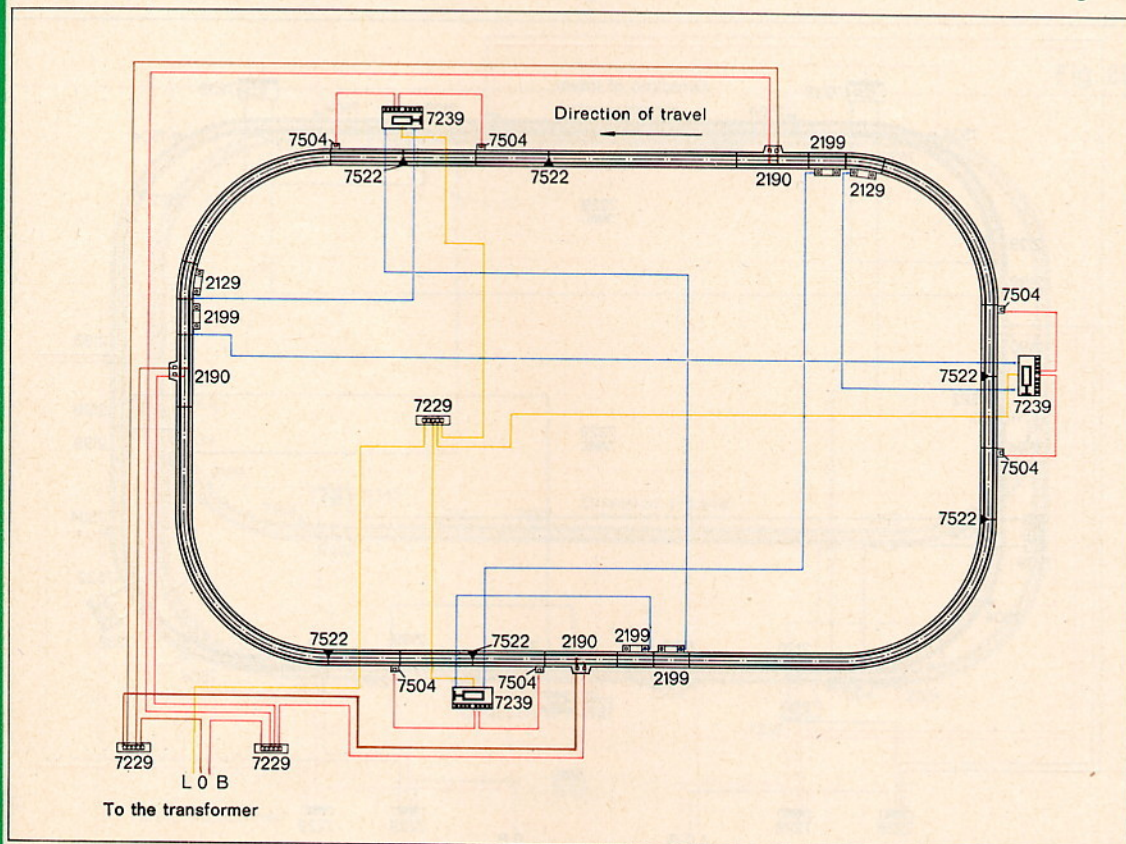
Layout with 1 signal and 2 trains

Fig. 66 shows how the layout is built up. One contact track, which is connected with a red plug, has to be installed about a length of a train behind the block signal. A little experimentation will decide where the other contact track should be installed. This contact track has to be connected with a green plug. The position of this track depends on the speed. It is allright in the beginning to install this contact track in the middle of the track section insulated by 7522 center stud insulators. The contact track with the red plug is installed on the opposite side of the track from the signal.

If the distance between the two running trains is too short, this contact track must be moved to correct this situation. However, when operating two trains with only one signal, there is a possibility of the trains colliding. The trains can collide with each other whenever one train is stopped, or the signal is closed by hand. In order to prevent this, when you are running two trains, three signals should be installed.

Automatic layout with two trains

Fig. 67



As a general rule, you should always use one more signal than the total number of trains you are running. For two trains you must use 3 signals, and for 3 trains 4 signals must be installed.

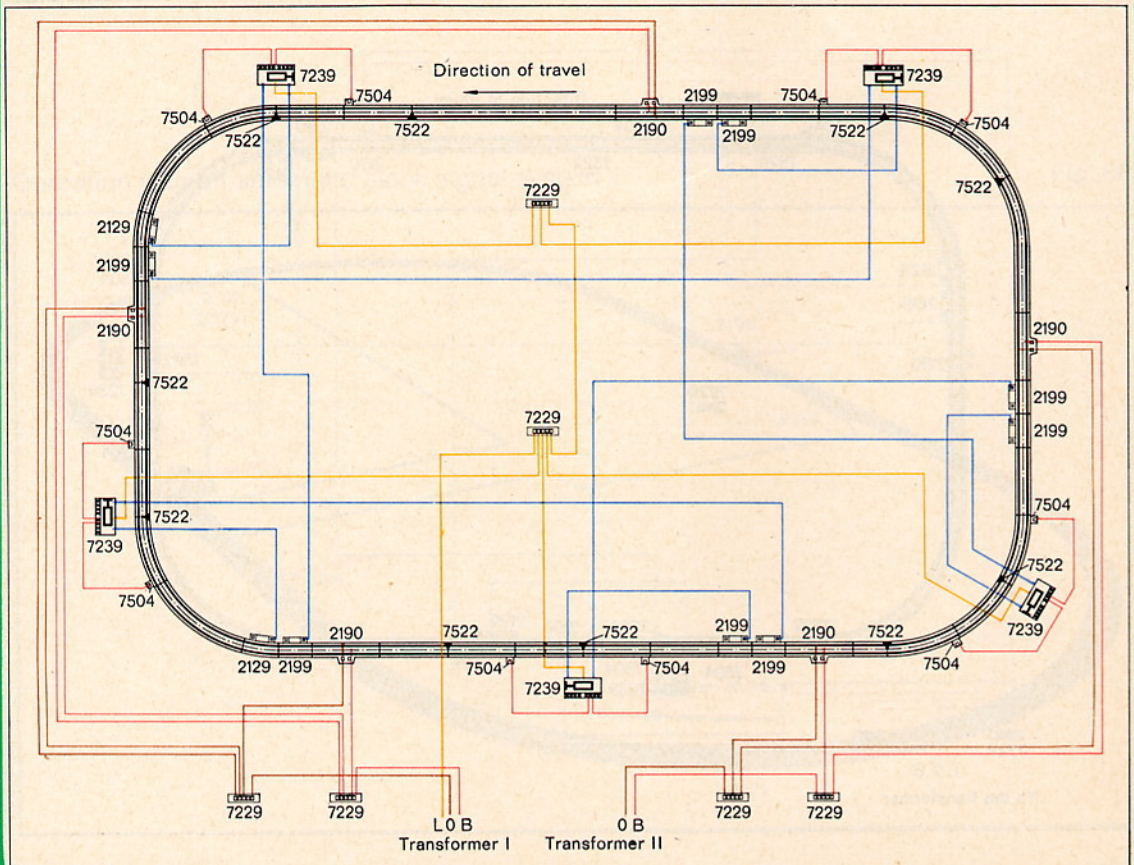
Layout with 3 signals and 2 trains

Fig. 67 shows this layout. When using this layout, the red plug of the first signal may be connected to the same contact track as the green plug of the next signal in the direction of travel.

Layout with 5 signals and 4 trains

Fig. 68 shows all the details of this layout. The principles of this layout are similar to the layout with 3 signals and 2 trains.

Fig. 68

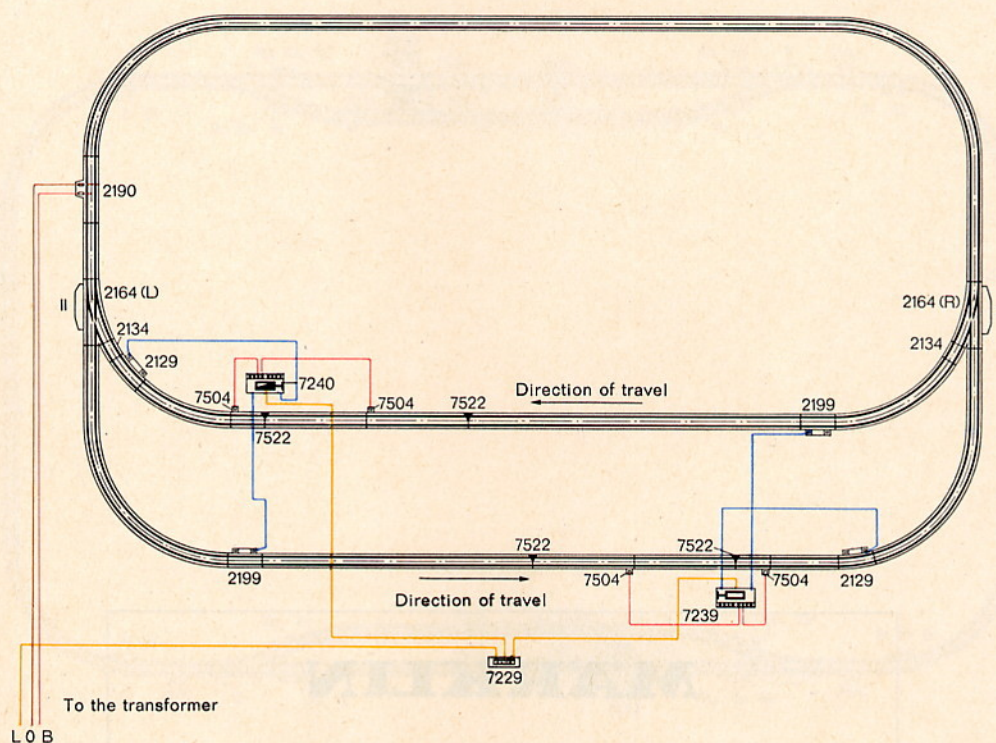


Layout and operation of the block track sections

The construction of layouts with more signals and trains is similar. But when using more trains, the voltage of one transformer will be too small and therefore two or more transformers must be used. The layout then has to be divided into two or more electrical circuits and for every circuit a transformer is necessary (Fig. 68).

When building layouts shown in Figs. 67, 68 and 70, a contact track must be used for every signal. This contact track is installed between the signal ahead and the insulated track section of each signal. A center stud terminal No. 7504 should be installed in each section of track behind each block signal, and these terminals should be connected to a distributor panel connected to the red socket of the transformer (Figs. 67 and 68). A short distance after each signal a contact track must be installed to close the signal. Right next to this contact track another must be installed to open the next signal (Figs. 67, 68 and 70). Some of the "ground" wires, which are shown in Figs. 67 and 68 may be omitted.

Fig. 69



Layout with 2 trains running in opposite directions, with two block signals.

Layout with 2 block signals, 2 trains, which are running in opposite directions

Fig. 69 shows this layout. The turnout 1 operates so that the train travels on the inner circle and the other train travels on the outer circle. The distance between the center stud insulator 7522 and the contact track must be greater, than the length of the train used, which stops before the signal. The train must not stop upon the contact track.

A block system on a layout with sidings

The layout in Fig. 70 is equipped for the operation of 5 trains, which are using the sidings alternatively. The signals and the turnouts, which are operating under the block system have numbers. Their connection with the equivalent contact track is indicated by numbers and figures. For example: "3r" means that the contact track has to be connected with the red "r" plug of the signal 3. For instance: "9g" or "11g", the green "g" plug of the signal 9 and the green plug of the switch 11 has to be connected to the certain contact track. "6o" means, that the orange "o" plug of the signal 6 has to be connected here.

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The connection of a home signal 7241 with a turnout

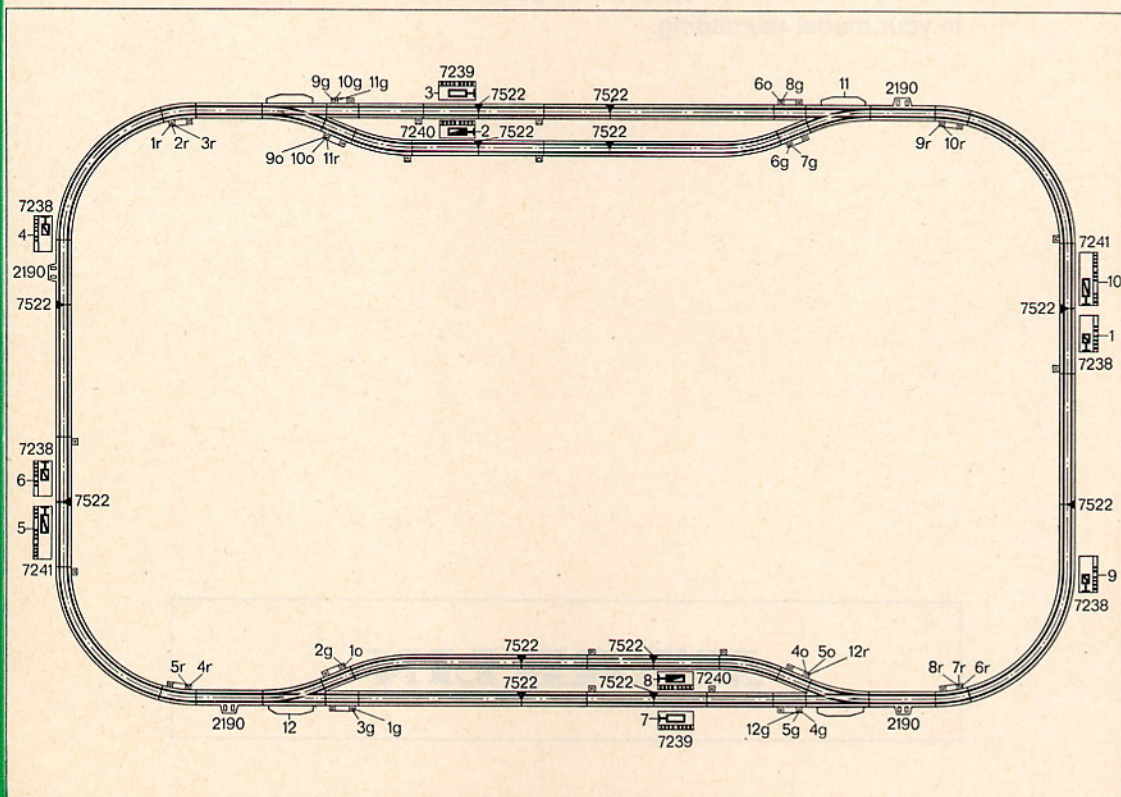
Fig. 70 shows how the home signal 10 and the turnout 11 can influence each other.

The connection which are necessary for this operation have to be connected to the signals 2 and 3. The contact track behind the signal 2 will get the connections "10o" and "11r", and the contact track behind signal 3 will get the connections "10g" and "11g".

When a train is passing signal 2, it actuates the contact track and signal 10 indicate "Slow" and the turnout 11 changes the siding. The train arrives on the free track and will stop in front of the home signal 2, which was changed to indicate "Stop".

When a train is passing signal 3, it will indicate the signal 10 for Stop and the turnout 11 for "straight ahead", when it passes the contact track.

Fig. 70



The block system on a layout with sidings.

Now the train, which arrives along the empty track can travel to the signal 3, which was indicated for "Stop".

The connection of the home signal 7041 with a turnout can be done also in the way as it was shown on Fig. 43.

The connection of the distant signals are not demonstrated on Figs. 66, 67, 68 and 69. But they can be connected very easily as is shown in Fig. 44, 45 and 46.

If you will follow the basic rules and examples carefully, you will be able to equip a large layout with the MÄRKLIN automatic block control system with ease. The many operations, which were described in this manual, may be used separately or in combination with each other. You will find much greater enjoyment with your layout, when these signals are installed to give you a completely safe train operation. Once you have studied the signal system and installed it, you should have no trouble in designing a larger layout. You will receive much greater pleasure from your layout, when it is operated in the same manner as the prototype.

The MÄRKLIN block system will guarantee you more enjoyment in your model railroading.

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