

HORSTMANN TIMERS & CONTROLS LTD.

a member of the Horstmann Gear Group Ltd.

Newbridge Works, Bath BA1 3EF, England

Telephone: Bath (0225) 21141 Telex: 44897

Leaflet No.

P.21750

Fitting Instructions

Type 423 Time Controls

SPECIFICATION

Contact Ratings 250V a.c.

Resistive Load 6A and 16A (Diamond-6A only)

Reactive Load 2.5A and 3A

Clock Motor 200–250v 50 Hz a.c. only.

Live Parts – Enclosed.

Dirt Protection – Normal Situations.

Moisture Protection – Ordinary.

Shock Protection – Class 1.

Contacts – Microgap.

MODELS:

DIAMOND

EMERALD

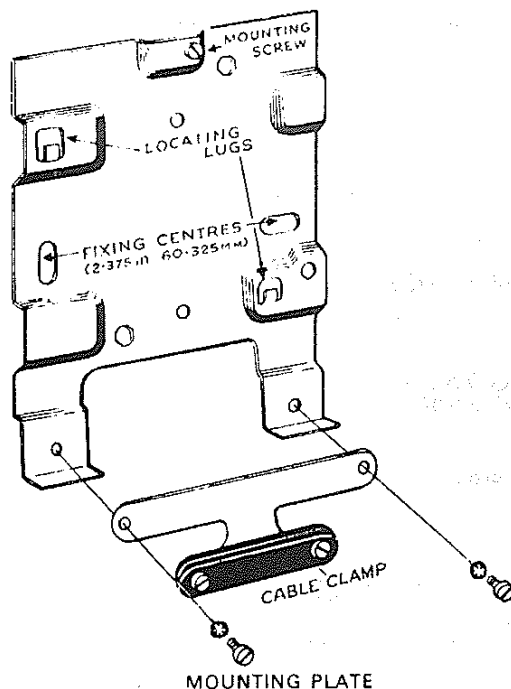
TOPAZ

PEARL 6A

PEARL 16A

**ISOLATE MAINS BEFORE
INSTALLATION**

FITTING THE TYPE 423 CONTROL



THIS UNIT MUST BE EARTHED

Fit the mounting plate (which is packed separately) securely into position and clear away all dust and debris.

For surface wired units using flexible or unclamped cables, an external cable clamp is provided. This clamp assembly (which is also packed separately) should be assembled to the mounting plate with the locking washers between the screw heads and the clamp bracket. Unpack the unit and loosen the captive screw on the underside of the case to withdraw the movement.

Basic wiring diagrams for all models are shown below.

Neutral and Earth connections that are not shown should be made to terminals N & E respectively. The bridging link L-3-1 can be removed to provide separate switch and motor terminal connections. Recommended cable sizes 1/.044, 3/.029 or 40/.0076 (flexible) for 6A models and 110/.0076 for 16A models.

'Par-a-way' cut-outs are provided to facilitate removal of the case moulding material for surface cable entry. Minimum removal of material is required to ensure close fit to cables.

To mount the movement, loosen the mounting screw on the mounting plate. Fit the movement to the plate ensuring that it engages correctly on the locating lugs and tighten mounting screw.

Ensure that the cables and cable clamp bracket (if used) are firmly fixed. Refit the case and tighten the captive screw.

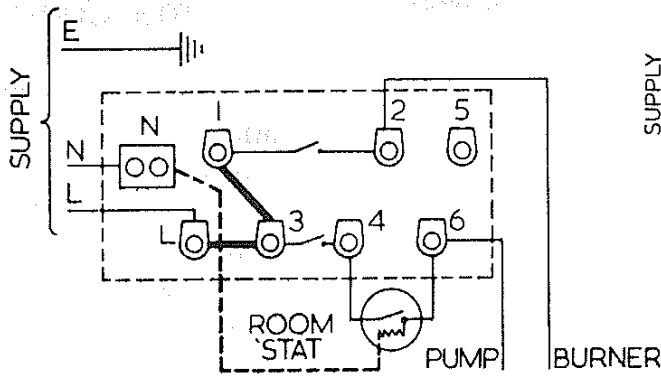
Note: Please do not at any time remove the clear moulded cover surrounding the movement.

CABLE CLAMP

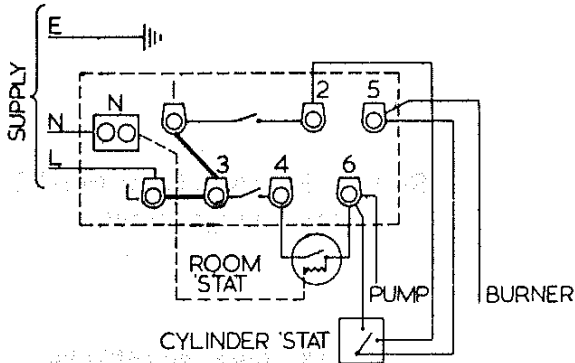
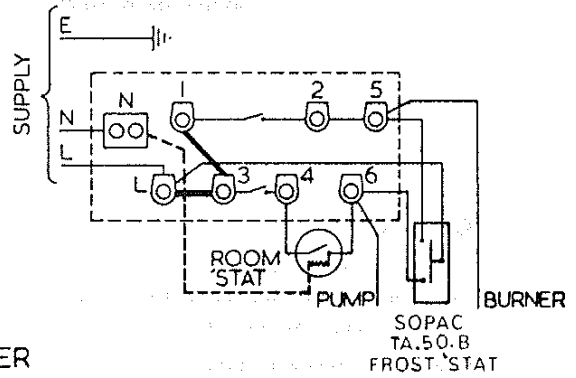
On all installations where wiring other than fixed wiring is used (i.e. flexible, unsecured wires) it is necessary to secure with a cable clamp which is available on request.

WIRING DIAGRAMS

Type 423 Diamond (Small Bore Control)



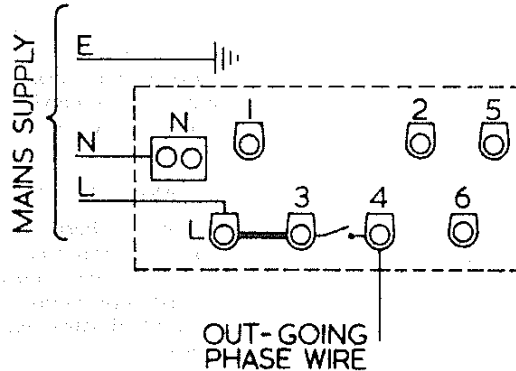
NOTE:
Terminals No. 5 & 6 are provided for linking and have no internal connections to the time control.



NOTE:
Circuit 2 to 5 Cyl. Stat calling for hot water.
Circuit 6 to 5 Cyl. Stat satisfied.

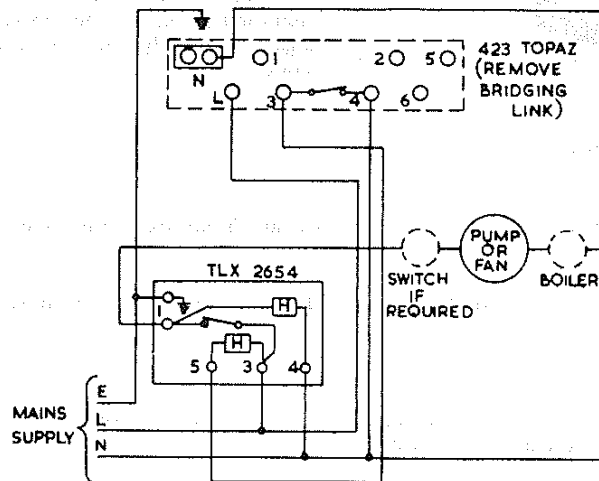
It should be noted that when this arrangement is used the cylinder thermostat will only be effective when 'Hot Water Only' programmes are selected.

Type 423 Emerald, 423 Topaz, 423 Pearl 6 and Pearl 16 (Single Circuit Controls)



Type 423 Topaz (for use with set-back room thermostat)

Typical arrangement



The manual ON/OFF switch and Room Thermostat are not supplied by Horstmann.

On all models the Bridging Link L-3-1 can be removed to provide separate switch and motor terminal connections.

USERS OPERATING INSTRUCTIONS

Type 424 Time Controls

PEARL – PEARL AUTO – EMERALD

TOPAZ 2 – DIAMOND

Switching Programmes Available

PEARL

ON/OFF Twice daily

PEARL AUTO

Choice of:

OFF

ON CONSTANTLY (24 hrs)

ON/OFF Twice daily

EMERALD

Choice of:

OFF

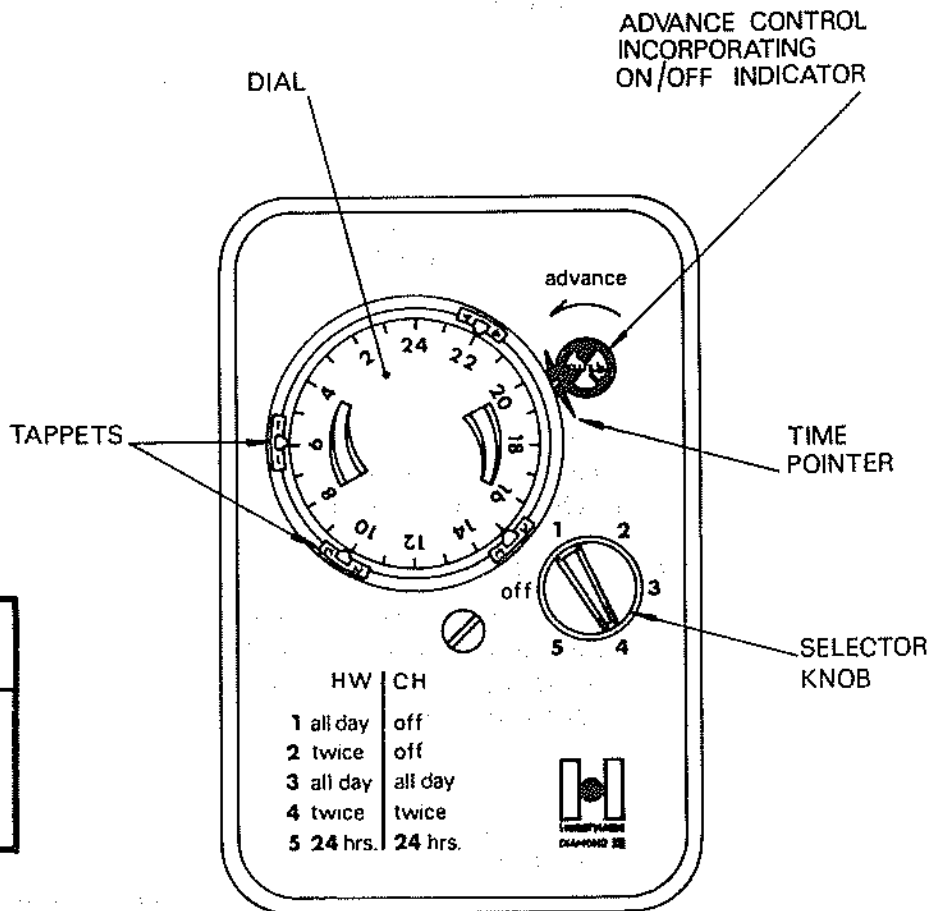
ON all day (Once)

ON/OFF Twice daily

ON CONSTANTLY (24 hrs)

TOPAZ 2 when used with night set-back thermostat system

Selector knob position	Heating
A	High all day
B	High/Low Twice daily
C	Constantly Low (24 hrs)
D	Constantly High (24 hrs)



DIAMOND when used with Central Heating/Domestic Hot Water System

Selector Knob Position	Central Heating	Hot Water
OFF	OFF	OFF
1	OFF	ON all day (once per 24 hours)
2	OFF	ON/OFF Twice per 24 hours
3	ON all day (once per 24 hours)	ON all day (once per 24 hours)
4	ON/OFF Twice per 24 hours	ON/OFF Twice per 24 hours
5	ON Constantly (24 Hours)	ON Constantly (24 Hours)



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THE DIAL

The Dial makes one revolution every 24 hours and turns clockwise as indicated by the arrow on the fascia.

It is numbered 1-24 in 2-hourly intervals.

IMPORTANT: When turning the dial by hand, to set to time always turn **CLOCKWISE**.

THE TIME POINTER

The inclined line on the fascia between the Advance Control Button and the dial opening indicates the time shown on the Dial.

THE TAPPETS

Tappets are numbered 1 to 4 and should be set in sequence according to the times of daily operations required.

Numbers 1 and 3 coloured **RED** indicate 'ON' operations. (Topaz 2 High)

Numbers 2 and 4 coloured **BLUE** indicate 'OFF' operations (Topaz 2 Low)

TO SET TAPPETS

Press down and slide round the dial until the white arrow head points to the desired operating time. After setting tappets ensure that the dial shows the correct time of day against the time pointer.

The minimum ON or OFF period is 1½ hours.

ADVANCE CONTROL

This provides a simple means of bringing forward the next tappet operation without moving the dial or re-setting the tappets.

To operate the Advance Control press in and turn as far as it will go in an **ANTI-CLOCKWISE** direction.

ON/OFF INDICATOR

RED and **BLUE** segments on the face of the advance control indicate when the control is ON or OFF.

With the selector knob set to make twice daily operations the control will be ON when the Red segment is opposite the Time Pointer and OFF when a Blue segment is in this position.

EMERALD DIAMOND TOPAZ 2 ONLY

When changing to an 'All Day' or 'Twice Daily' programme between tappet operations 2 and 3 check that the ON/OFF indicator is in its correct position as required by the programme. If necessary use the Advance Control to put the switch in sequence with the programmed operation.

No Programme Selector Knob is fitted to the PEARL

PROGRAMME SELECTOR DIAL

Choice of 3 programmes on PEARL AUTO

Choice of 4 programmes on EMERALD & TOPAZ 2 as shown overleaf.

Choice of 6 programmes on DIAMOND as shown overleaf.

The term 'ALL DAY' signifies that the control will be switched ON by tappet 1 and will remain ON until switched OFF by tappet 4.

NOTE:

Due to continual improvement in design strict accuracy of description or illustration cannot be guaranteed.

**USERS
OPERATING INSTRUCTIONS**

**Type 423 Time Controls
PEARL - PEARL AUTO - EMERALD
TOPAZ 2 - DIAMOND**

Switching programmes available

PEARL

ON/OFF Twice daily

PEARL AUTO

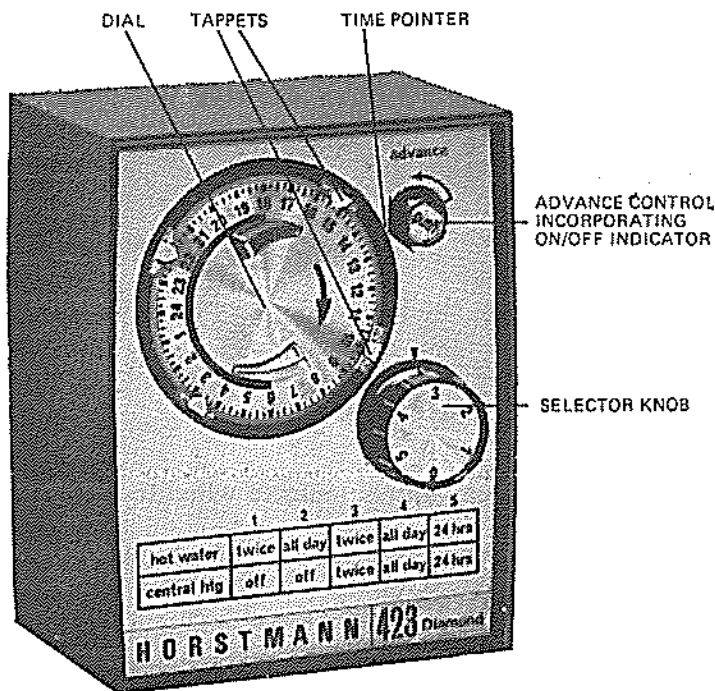
Selector knob position	Heating
OFF CONSTANT AUTO	Constantly Off Constantly On ON/OFF Twice daily

EMERALD

Programme dial position	Heating
0	Constantly Off
1	ON/OFF Twice daily
2	ON all day
3	Constantly ON

TOPAZ 2 when used with night set-back thermostat system

Selector knob position	Heating
A	Constantly High
B	Constantly Low
C	High/Low Twice daily
D	High all day



DIAMOND when used with Central Heating/Domestic Hot Water System

Programme dial position	Heating		Control
	Central Heating	Hot Water	
0	OFF	OFF	ON/OFF Twice daily ON all day ON/OFF Twice daily ON all day Constantly ON
1	OFF	ON	
2	OFF	ON	
3	ON	ON	
4	ON	ON	
5	ON	ON	

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THE DIAL

The Dial makes one revolution every 24 hours and turns clockwise as indicated by the arrow on the fascia.

It is numbered 1—24 in hourly intervals with $\frac{1}{2}$ hour sub-divisions.

IMPORTANT: When turning the dial by hand, to set to time always turn **CLOCKWISE** in the direction of the arrow.

THE TIME POINTER

The inclined line on the fascia between the Advance Control Button and the dial opening indicates the time shown on the Dial.

THE TAPPETS

Tappets are numbered 1 to 4 and should be set in sequence according to the times of daily operations required.

Numbers 1 and 3 coloured **RED** indicate 'ON' operations. (Topaz 2 High)

Numbers 2 and 4 coloured **BLUE** indicate 'OFF' operations. (Topaz 2 Low)

TO SET TAPPETS

Press down and slide round the dial until the white arrow head points to the desired operating time. After setting the tappets ensure that the dial shows the correct time of day against the time pointer.

The minimum ON or OFF period is $1\frac{1}{2}$ hours.

ADVANCE CONTROL

This provides a simple means of bringing forward the next tappet operation without moving the dial or re-setting the tappets.

To operate the Advance Control press in and turn as far as it will go in an **ANTI-CLOCKWISE** direction.

ON/OFF INDICATOR

RED and **BLUE** segments on the face of the advance control indicate when the control is ON or OFF.

With the selector knob set to make twice daily operations the control will be ON when the Red segment is opposite the Time Pointer and OFF when a Blue segment is in this position.

EMERALD DIAMOND TOPAZ 2 ONLY

When changing to an 'All Day' or 'Twice Daily' programme between tappet operations 2 and 3 check that the ON/OFF Indicator is in its correct position as required by the programme. If necessary use the Advance Control to put the switch in sequence with the programmed operation.

No Programme Knob is fitted to the PEARL

OFF/CONSTANT/AUTO Selector—applies only to PEARL AUTO & TOPAZ 2

This is a 3 position selector providing the choice of switching programme shown overleaf.

PROGRAMME SELECTOR DIAL

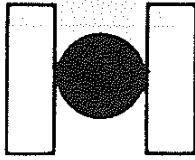
Choice of 4 programmes on EMERALD & TOPAZ 2 as shown overleaf.

Choice of 6 programmes on DIAMOND as shown overleaf.

The term 'ALL DAY' signifies that the control will be switched ON by tappet 1 and will remain ON until switched OFF by tappet 4.

NOTE:

Due to continual improvement in design, strict accuracy of description or illustration cannot be guaranteed.



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Telephone: 0225 21141.

FITTING INSTRUCTIONS

Type 424
Time Controls

SPECIFICATION

Contact Ratings 250V a.c.
 Resistive load 6A & 16A (Dia. 6A only).
 Inductive load 2.5A & 3A
 Clock Motor 200-250V 50Hz a.c. only
 Live Parts — Enclosed
 Dirt Protection — Normal Situations
 Moisture Protection — Ordinary
 Shock Protection — Class 1
 Contacts — Microgap

MODELS

DIAMOND
 EMERALD
 TOPAZ
 PEARL AUTO
 PEARL

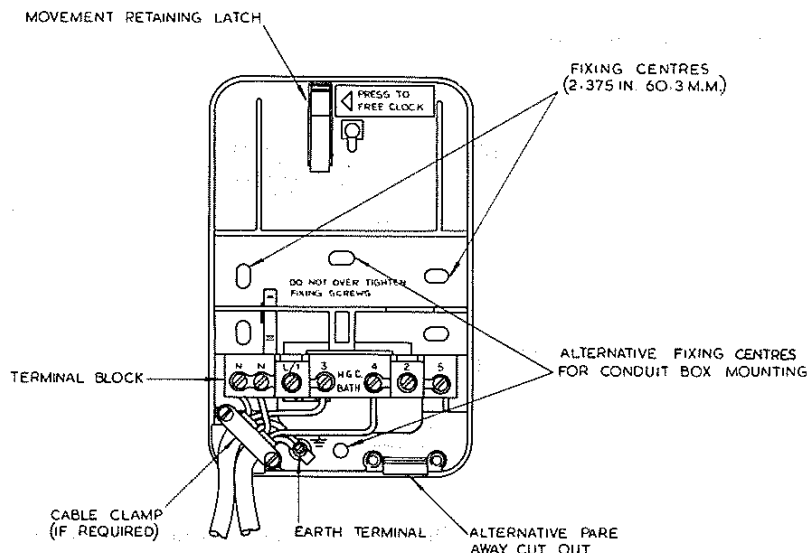
**ISOLATE MAINS BEFORE
 INSTALLATION.**

THIS UNIT MUST BE EARTHED

FITTING THE TYPE 424 CONTROL

Remove outer case secured by means of fixing screw on front of unit.
 Press movement retaining latch and un-plug movement by sliding away from terminal block, and place aside away from contamination by dust.
 Make connections to terminal block on back plate as per the basic wiring diagrams shown below.
 Neutral and Earth connections that are not shown should be made to terminals N & E respectively. On single circuit models i.e. Pearl, Pearl Auto, Topaz and Emerald the bridging link L/1 — 3 can be removed to provide separate switch and motor terminal connections.
 Recommended cable sizes 1/1.13mm or 1/1.38mm, 24/.20mm or 32/.20mm (flexible) for 6A models and 1/1.78mm, 50/.25mm or 56/.30mm (flexible) for 16A models. In accordance with the appropriate I.E.E. regulations.
 Fit the mounting plate securely into position and clear away all dust and debris.
 A 'knockout' section is provided in the bottom corner of the mounting plate to facilitate surface cable entry.
 A cable clamp is available on request for surface wired units using flexible or unclamped cables, in this case it is essential that a cable clamp is used.
 A cable clamp is unnecessary where fixed wiring is used.
 To fit the movement to the mounting plate ensure the keyhole slot in the backplate of the movement is engaged over the conical stud in the mounting plate, then slide the movement into the terminal block. Ensure correct engagement by observing the retaining latch is over and against the edge of the movement backplate.
 Ensure that all terminal screws are firmly tightened and that the cable clamp (if used) is firmly fixed.
 Refit the case and tighten case retaining screw.
 Set the tappets to the operating times required and the dial to show the correct time of day.
 Switch on power.
 Before handing over a new installation to the user always verify that the system responds correctly on all Control Programmes and that other electrically operated equipment and controls are correctly adjusted.
 Explain how to operate the control to the user and hand over the operating instruction leaflet.
 For further information on wiring our controls please contact the Technical Services Department at the address above.
 For servicing information please contact the Service Department.

Note: Please do not at any time remove the clear moulded cover surrounding the movement.

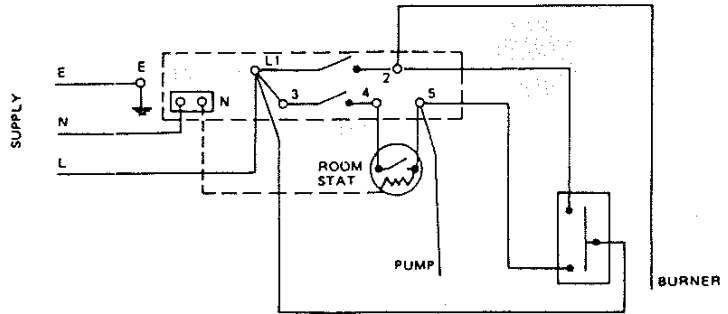
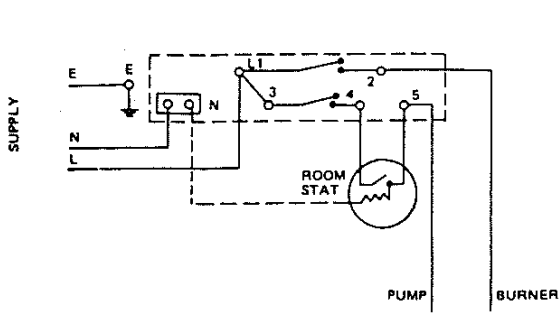


**MOUNTING PLATE SHOWING
 TYPICAL WIRING ARRANGEMENT**

WIRING DIAGRAMS

TYPE 424 DIAMOND

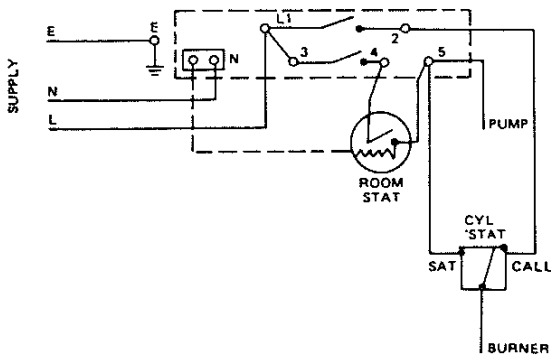
CONNECTIONS FOR DOUBLE POLE FROST 'STAT



TERMINAL No. 5 IS PROVIDED FOR LINKING AND HAS NO INTERNAL CONNECTION TO THE TIME CONTROL.

DOUBLE POLE FROST 'STAT
E.G. SOPAC TA 50 B

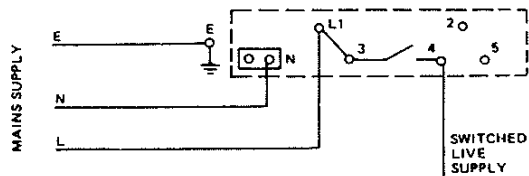
CONNECTIONS FOR ROOM 'STAT & CYLINDER 'STAT



It should be noted that when this arrangement is used the cylinder thermostat will only be effective when 'Hot Water Only' programmes are selected.

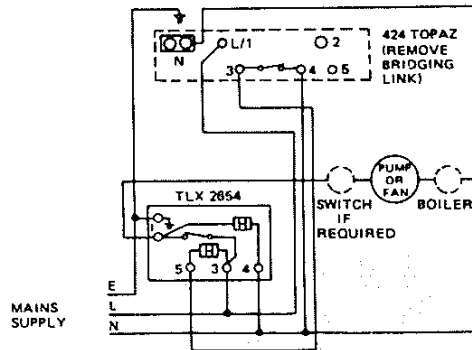
Type 424 Emerald, Pearl Auto & Pearl (Single Circuit Controls)

(For separate switch & motor terminals remove link between L/1 & 3).



Type 424 Topaz (for use with set-back room thermostat)

Typical arrangement



The manual ON/OFF switch and Room Thermostat are not supplied by Horstmann.

THE DIAL

The Dial makes one revolution every 24 hours and turns clockwise as indicated by the arrow on the fascia.
It is numbered 1—24 in hourly intervals with $\frac{1}{2}$ hour sub-divisions.
IMPORTANT: When turning the dial by hand, to set to time always turn **CLOCKWISE** in the direction of the arrow.

THE TIME POINTER

The inclined line on the fascia between the Advance Control Button and the dial opening indicates the time shown on the Dial.

THE TAPPETS

Tappets are numbered 1 to 4 and should be set in sequence according to the times of daily operations required.
Numbers 1 and 3 coloured **RED** indicate 'ON' operations.
Numbers 2 and 4 coloured **BLUE** indicate 'OFF' operations.

TO SET TAPPETS

Press down and slide round the dial until the white arrow head points to the desired operating time. After setting the tappets ensure that the dial shows the correct time of day against the time pointer.
The minimum ON or OFF period is $1\frac{1}{2}$ hours.

OFF/CONSTANT/AUTO Selector

(Applies to CORAL, SAPPHIRE, AMETHYST 7)
This is a 3 position selector giving, according to the position of the selector knob pointer, - a) Constantly OFF
b) Constantly ON
c) AUTO Twice Daily time controlled ON/OFF operation

OFF/1—2—3 Selector

(Applies to LEUCITE and AMBER)
This is a 4 position selector giving, according to the position of the selector knob pointer, - a) Constantly OFF
b) Constantly ON
c) AUTO twice daily time controlled ON/OFF operation
d) ON ALL DAY
The term 'All Day' signifies that the Control will be switched ON by tappet 1 and will remain ON until switched OFF by tappet 4.

THE ADVANCE CONTROL

The Advance Control provides a simple means of bringing forward the next tappet operation without moving the dial or resetting tappets.
To operate the Advance Control: Press in and turn as far as it will go in an **ANTI-CLOCKWISE** direction.

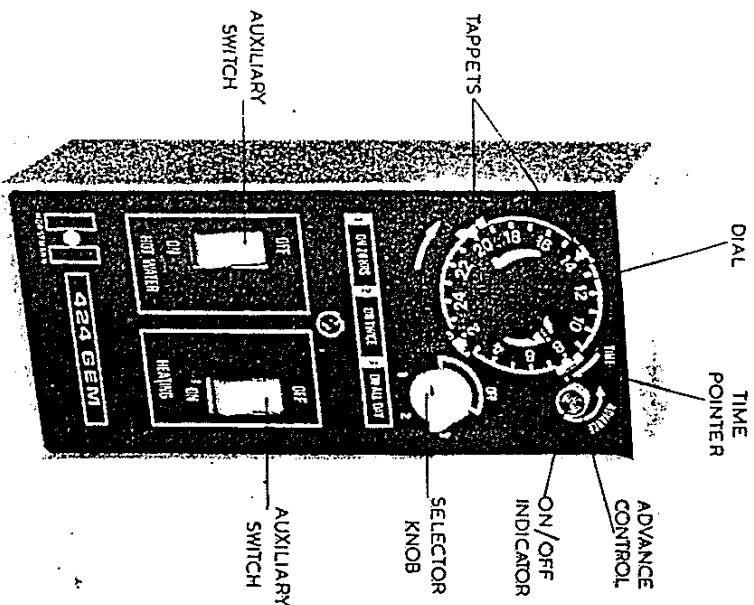
ON/OFF INDICATOR

RED and **BLUE** Segments on the face of the Advance Control indicate when the Control is ON or OFF.
With the Selector Knob set to make Twice Daily or All Day operations, the Control will be ON when a Red Segment is opposite the time pointer and OFF when a Blue Segment is in this position.
When changing the Selector Knob to a Twice Daily or All Day position between tappet operations 2 and 3, check that the Indicator is in its correct position as required by the Programme. If not, use the Advance Control to bring the operation into correct sequence.

USERS

OPERATING INSTRUCTIONS:

Type 424 Time Controls
GEM, AMBER — AMETHYST 7
LEUCITE — CORAL — SAPPHIRE



AMBER. Selection of hot water only, or hot water and central heating, with OFF/CONSTANT/TWICE DAILY/ALL DAY control.
AMETHYST 7. Selection of hot water only, hot water and central heating, or central heating only, with OFF/CONSTANT/AUTO control.
GEM & LEUCITE. Selection of hot water only, hot water and central heating, or central heating only, with OFF/CONSTANT/TWICE DAILY/ALL DAY control.
CORAL. Selection of hot water only, or hot water and central heating with OFF/CONSTANT/AUTO control.
SAPPHIRE. Selection of hot water priority or central heating priority with OFF/CONSTANT/AUTO control.

THE HORSTMANN GEAR COMPANY LIMITED
NEWBRIDGE WORKS · BATH · BAI 3EF · ENGLAND
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ADDITIONAL SWITCHING FACILITIES

These are indicated for each Model and allow a greater selection of programmes than would be available when using a Selector Knob only.

GEM, LEUCITE & AMETHYST 7

These include two switches to select Hot Water only, Hot Water and Central Heating and Central Heating only.

The AMETHYST 7 : A choice of 7 alternative programmes is available.

The LEUCITE : A choice of 10 alternative programmes is available.

Hot Water	Central Heating	Auxiliary Switch Position		GEM & LEUCITE Selector Knob Position	AMETHYST 7 Selector Knob Position
		Hot Water Heating	Central Heating		
OFF	OFF	Any Position	Any Position	OFF	OFF
Constant Twice Daily All Day	Constant Twice Daily All Day	ON	ON	1	Constant Auto (Not available)
		ON	ON	2	Constant Auto (Not available)
		ON	ON	3	Constant Auto (Not available)
Constant Twice Daily All Day	OFF	ON	OFF	1	Constant Auto (Not available)
		ON	OFF	2	Constant Auto (Not available)
		ON	OFF	3	Constant Auto (Not available)
OFF	Constant Twice Daily All Day	OFF	OFF	1	Constant Auto (Not available)
OFF	Constant Twice Daily All Day	OFF	OFF	2	Constant Auto (Not available)
OFF	Constant Twice Daily All Day	OFF	OFF	3	Constant Auto (Not available)

THE CORAL

This includes a switch to select Hot Water only or Hot Water and Central Heating. This is sometimes referred to as a 'Summer Switch' because it allows the Central Heating to be switched off without interfering with the supply of Hot Water.

A choice of 5 alternative Programmes is available :

HOT WATER	CENTRAL HEATING	SELECTOR KNOB POSITION	AUXILIARY SWITCH POSITION
OFF	OFF	OFF	Either Position
Constant Twice Daily	Constant Twice Daily	Constant Twice Daily	Hot Water and Central Heating
			Hot Water only

THE AMBER

This includes a switch to select Hot Water only or Hot Water and Central Heating. This is sometimes called a 'Summer Switch' because it allows the Central Heating to be switched OFF without interfering with the supply of Hot Water.

A choice of 7 alternative programmes is available

HOT WATER	CENTRAL HEATING	SELECTOR KNOB POSITION	AUXILIARY SWITCH POSITION
OFF	OFF	OFF	Either Position
Constant Twice Daily All Day	Constant Twice Daily All Day	1	Hot Water and Central Heating
		2	Hot Water and Central Heating
		3	Hot Water and Central Heating
Constant Twice Daily All Day	OFF	1	Hot Water only
		2	Hot Water only
		3	Hot Water only

THE SAPPHIRE

This includes a switch to select Hot Water priority or Central Heating priority.

When in the Hot Water priority position, Central Heating will not be provided until Hot Water requirement is satisfied.

When in the Central Heating priority position, Hot Water will not be provided until Central Heating requirement is satisfied.

A choice of 5 alternative programmes is available

HOT WATER AND CENTRAL HEATING	PRIORITY GIVEN TO :	SELECTOR KNOB POSITION	AUXILIARY SWITCH POSITION
OFF	OFF	OFF	Either Position
Constant Twice Daily	Hot Water	Constant Auto	Hot Water Priority
			Central Heating Priority

Horstmann Centaur Programmer Type 404/Q/4.

Fitting Instructions.

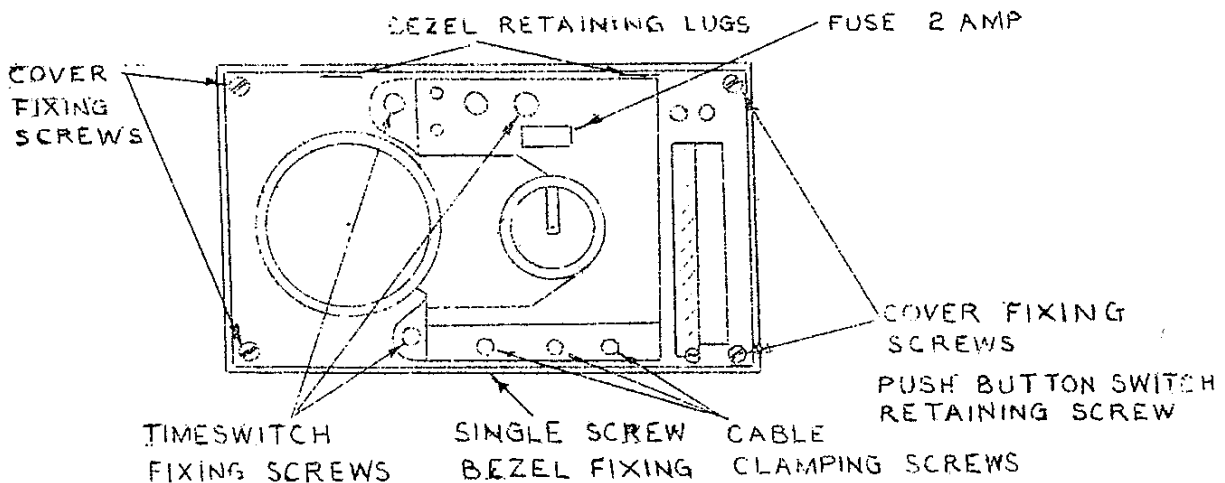
Capacity: Rating at 250 v a.c. only
2 amp Resistive load.
½ h.p. Motor load.

To fit the Centaur to the wall.

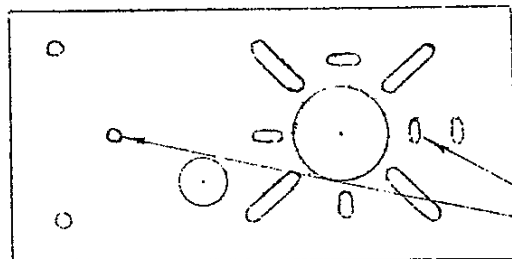
Remove the front panel. This is secured by a single screw on the underside of the programmer. Pull the bezel forward and downwards. Extra clearance can be gained by depressing button 1.

Unscrew the 4 cover fixing screws and lift off cover.

Remove the push button switch and the neon indicator lamps from their holders. Remove the time switch from the backplate.



Fit the backplate to the wall. The backplate is pierced to mount onto any standard BS conduit box up to 6" x 3". Fixing holes are also provided for screwing directly onto the wall for surface wiring. No 6 countersunk woodscrews are recommended.



WALL MOUNTING POSITIONS
(No. 6 COUNTERSUNK SCREWS)

Wiring.

The wiring should be carried out before refixing the time switch to the backplate.

Remove the manual knob by a firm pull.

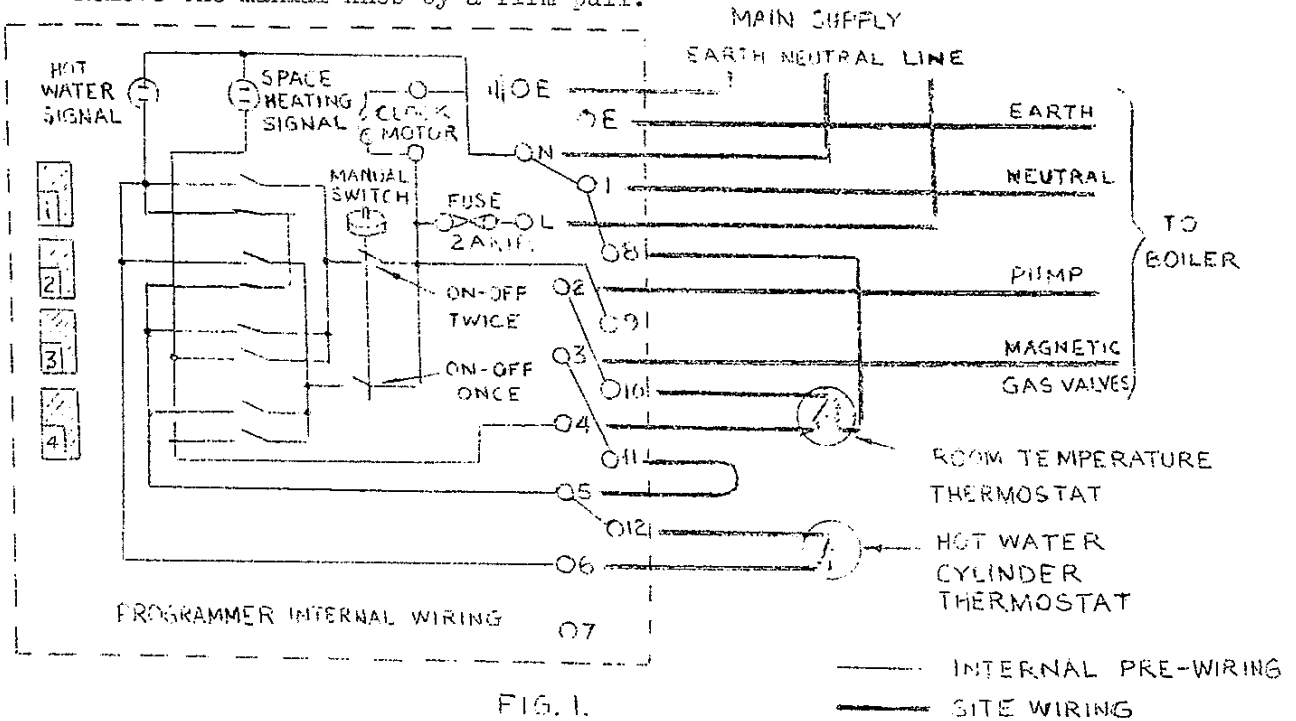


FIG. 1.

The main supply must be connected through an isolating switch to terminals L.N. and E. a fuse of 2 amp rating is incorporated in the programmer.

The wiring of the programmer and small bore boiler is shown in fig. 1.

N.B. If a room thermostat and/or hot water cylinder thermostat is not required leave in position the shorting links between terminals 4 & 10 and 6 & 12 respectively.

Cable Clamping.

After wiring, clamp the cables securely in the clamp provided if the unit is surface wired.

Replace the time switch and push button switch, and replace the neon indicator lamps making sure that the marked lamp is replaced in the marked holder.

Refit outer cover and front panel, paring away the cut outs in the cover to clear surface wires.

Fitting high-low temperature control.

If a background heating "night" thermostat or low limit thermostat for frost protection is required this should be wired in accordance with fig. 2.

In this position the 'ON' operation normally carried out by the silver plain tappet is cancelled, thereby giving only one 'ON' period per day. Relock the tappets, turn the manual knob to 'AUTO' and set to the correct time of day as described above.

The programmes now available are the same as shown in the table except that when buttons 1 or 3 are pushed, the second 'ON' period is omitted.

To Select the Programmes.

The programmes available are shown in fig 6. These are selected by depressing the relative button with the manual knob in the 'Auto' position. With the manual knob in the 'ON' position the circuit selected is programmed continuously, whilst with the manual knob in the 'OFF' position both circuits will be 'OFF'. Do not press more than one button at a time.

To Switch the appliance 'ON' or 'OFF' in advance of the pre-set time.

To switch the appliance 'OFF' in advance of the pre-set 'OFF' time, turn the manual knob to the 'OFF' position and return to the central 'AUTO' position.

To switch the appliance 'ON' in advance of the pre-set 'ON' time, turn the manual knob to the 'ON' position and return to the central 'AUTO' position.

N.B. This operation cannot be carried out within 45 minutes of an 'OFF' tappet passing the time indicator.

WARNING.

DISCONNECT FROM MAINS SUPPLY BEFORE REMOVING OUTER CASING.