
# REMOTE LIGHTING CONTROL
# INSTRUCTION MANUAL

## INTRODUCTION

System C/AE4 employs System CRD/R silicon controlled rectifier (thyristor) dimmers. The technical operation of these dimmers is described elsewhere for the circuitry special to System C/AE is concerned solely with the facilities provided by the control desk --- principally with the method of grouping the feed to the individual dimmer levers from the master dimmers.

As in a conventional multi-preset control desk the wiper connections of the four miniature dimmer lever potentiometers to each control channel each have a blocking diode, to prevent feedback, and are then joined at the control desk to provide the 'dimmer' input signal.

The schematic wiring diagram of System C/AE4 is drawn in such a manner that the wiring diagram for System CRD/R can be placed above it to complete the 'dimmer' connections. The Dimmer Racks also provide 24v AC. via control terminals A,B,E to the Preset Splitter Cabinet for the master dimmers (Power Unit Ref. 826 and 4 Way Regulator Ref. 884) and for the internal fan and to the fans in the wings and master desk. In addition control terminals T,S,R on the Dimmer Rack connect to the pair of pilot lamps, mounted on the master desk, which indicate the state of the internal temperature of that Dimmer Rack.

On the wiring diagram part of a Dimmer Lever Wing is shown at the bottom right hand side, the Master Desk at bottom centre, and the pairs of memory pushes at the bottom left. Above these the Splitter is shown. The upper part of the drawing shows the Data store consisting of the Coupler Cabinet (with the Relay Cabinet units inset) at the right hand side, and the Memory Cabinet(s) at the left hand side. The centre of the drawing shows all master control connections, and the left hand side all components common to the three pairs of memory pushes. The right hand side of the diagram shows all connections associated with two channels.

In practice over 95% of the wiring is repetitive as for each channel the same circuit is repeated twice - once for the'left' presets and again for the 'right' presets. The Preset Splitter divides the output of the 'left' routing relays and indication into Presets I and II and the output of the 'right' counterpart into Presets III and IV. The grouping is therefore always the same on Presets I and II or Presets III and IV. The position of the Preset master dimmer levers determine which preset is effective and on which preset the grouping information is to be displayed. Electrically there is also another important division as each cabinet in the Data Store caters for 120 channels and therefore for a total of 240 channels each cabinet is duplicated and the master controls connected in parallel.

## THE DIMMER LEVER WINGS.

These house the four dimmer lever units to each control channel. All four are mounted in the same wing - two, one above the other, on the left hand side, and the other two similary on the right hand side. Collectively the upper rows of the left hand side are known as Preset I and the lower rows as Preset II. Similarly the right hand side houses Preset III and Preset IV. Each wing houses all controls for 120 channels.

The dimmer lever units Ref 845, have a quadrant scale moulding which rocks to operate an internal micro-switch when pressed at the top. The scale is translucent and can be internally illuminated either red or white, or red and white simultaneously, by two internal lamps. These lamps have clear glass bulbs, the light from one being coloured red by a moulded red enclosure. Both wire-ended lamps are considerably underrun to provide a long life. As the 'red' lamp is fed with 15/17v. it has a series resistor so that it provides an equivalent illumination of the scale as the 'white' lamp which is fed with $4\frac{1}{2}$v. AC.

The dimmer lever units are located by a printed circuit edge connector and secured by the horizontal label strips. A special tool, which hooks under the dimmer lever knob, is necessary to remove the units safely. The preset potentiometer wired in parallel with the dimmer lever potentiometer should not be altered as it is adjusted for the dimmer curve required. The plug and socket connections are identified on the schematic wiring diagram. Note that the wiper arms of the four dimmer lever potentiometers to each channel are joined through blocking diodes but that the control signal to the dimmer is taken through a loading resistor on the Preset I unit and therefore if this dimmer lever unit is removed it will break the 'dimmer' connection from the other units.

To avoid possible confusion it is necessary to stress that references to 'left' and 'right' do not apply to the two Dimmer Lever Wings but to the vertical sub-division of each Wing.

PRESET SPLITTER CABINET REF 909

This cabinet, sited above the control room, is the junction point for all control cables from the two wings and master desk and the Data Store. It houses the master dimmers (Power Unit Ref 826 and 4 Way Regulator Ref 884), the transistorised Integrators Ref 889 which are controlled by the Preset master dimmer levers, and the multi-contact coupler switches that determine which dimmer lever units are to display the routing indication.

Fuse F.1 protects the coils of couplers associated with the 'red' and 'white' lamp indication on Preset I dimmer lever units; Fuse F.2 coupler coils for Preset II; Fuse F.3 coupler coils for Preset III; and Fuse F.4 coupler coils for Preset IV. Fuse F.5 protects the coils of relays RL1-4, the DBO Relay RL5 and the indicator lamps on the master desk. Fuse F.6 and F.7 protect the stabilised power supplies to the F.O.H. master unit. Fuses F.8 - 15 protect the eight dimming pilot lights on each wing.

COUPLER CABINET REF 857

This cabinet houses the master relays RL1-8, the control circuit group fuses, the multi-contact coupler switches, designated RC, for the routing of information, and the reverser relays (RLR) for the selection of channels either by hand selection or by the use of a memory path.

Although for clarity the Relay Units Ref 856 are shown inset in the Coupler Cabinet area of the diagram they are normally housed in the Relay Cabinet Ref. 878. If however the coupler cabinet is for 60 channels only then the corresponding number of Relay Units will be housed in the same cabinet.

The master relays RL1-RL8 (there is no RL2) are mounted on a hinged panel together with socket SK1 which is for connections from the Master Panel, and socket SK2 which is for connections to and from the Memory Cabinet Ref.879. This panel also contains the principal control circuit fuses. Fuses F1-F12 protect the 41½v AC. supply to the Relay Units Ref.878 in groups of ten consecutive channel numbers. Fuses F13-F24 protect the 15v - supply to the Relay Units again in groups of ten. Fuses F25-36 protect the 15v - supply to the reverser relay (RLR) coils in groups of ten. Fuse F.37 protects the 15v - supply to the Coupler coils RC1 - 10 and RC33, Fuse F.38 Coupler coils RC11 - 2P and RC34, Fuse F.39 Coupler coils RC21 - 32 and F.40 the master relays RL1 - 8.

The coupler switches are all for 60 pairs of contacts opened or closed simultaneously and therefore the standard coupler cabinet for 120 channels has two couplers for most functions, the operating coils being operated in parallel. Contacts are counted from the top downwards and therefore a connection associated with channel 65, for example, would be the fifth contact down on the highest numbered of the pair of couplers associated with a particular function. Each pair of contacts consists of a fixed bar and a moving contact. The fixed bar may be common to two or more sets of contacts (for example see RC1, RC2, RC3) The contacts are usually normally open but on RC5, RC10, RC15, RC20 the contacts are normally closed to the fixed bar and opened only when the operating coil is energised.

In addition to the 60 contacts four additional pairs of contacts are fitted at the bottom but these are reserved for electrical interlocks and spares, and may be normally open or normally closed. It should be noted that where interlocks exist, for clarity, they are drawn adjacent to the coil though in practice they are at the bottom. The bottom bar is often used purely as a connection point for a component such as a blocking diode.

The reverser relays (RLR) each have two sets of changeover contacts. The set of contacts drawn adjacent to the coil are used for the selector switch and the set of contacts drawn at the top are interconnected with the operating coil in such a manner that when 'on' information is fed from the memory device to the reverser relay, this is fed to the operating coil only if the selector switch contacts are open. These contacts changeover each time the coil is energised as they are operated by a rotary cam which in turn is operated by a rachet device which forms the armature of the operating coil.

RELAY CABINET REF 878 AND RELAY UNITS REF 856

This cabinet houses only the Relay Units Ref 856 which are arranged in two vertical rows on each side of the cabinet.

The Relay Unit Ref 856 is a sub-assembly fitted with four relays, RL1 - RL4, suppression and blocking diodes, an 8 pole plug and a 14 pole socket. All connections to the 8 pole plug are to or from the control desk wing. All connections to the 14 pole socket are from the Coupler Cabinet. On the wiring diagram the fixed plug and socket are identified and the pin numbers given for them both.

Relays RL2 and RL3 are of the conventional type, but relays RL1 and RL4 are remanent relays each with an operate coil and a release coil. On this type of relay a feed to the operate coil causes the armature, and therefore the contacts, to close but they remain closed when the feed is removed as the remanent magnetism in the core material is sufficient to retain the armature. This magnetic field is cancelled if the release coil is energised and therefore the armature and contacts then open. The release coil is series fed through a pair of contacts on the same relay, known as the suicide contacts, so that the release coil can only de-magnetise the core. Relays RL1 and RL2 are solely concerned with one left presets, the circuitry being duplicated on relays RL3 and RL4 for the right presets.

The 14 pole free plug should not be removed from the Relay Unit while the equipment is switched on as two pins are above earth potential and therefore it is all to easy to short these to chassis and blow a fuse (F1-12 or F13-24) which will affect ten consecutively numbered channels.

MEMORY CABINET REF 879

This cabinet houses the memory boxes, each for 60 channels and 20 paths and a cancel, and the relays associated with the memory device. At the base of this cabinet there is the transformer/rectifier assembly which provides the control voltages for the data store. The largest output is nominal 15/17v DC. for relay operation, there is also a 41v AC. supply used solely for the 'white lamps' in the dimmer lever units and a 30v AC. supply which is fed to a Ref 823 Stabiliser to provide smooth DC. power supplies for the Ref 858 Flip Flop Units which provide the indication of the last memory push pressed.

MEMORY CABINET REF 888

This houses additional memory boxes and their associated components for an extra 20 memory paths.

SELECTION AND TRANSFER FACILITIES.

It is convenient to describe the circuitry step by step in a typical operational sequence. It is therefore assumed that at the start of this sequence that although individual dimmer levers may be preset to intermediate positions both the A and C (red scale) and II and IV master dimmer levers are at zero, both the B and D (white scale) and I and III master dimmers at full, and that as no channels are as yet operative none of the internal pilots within the dimmer lever scales are alight. References given are for the 'left' presets, i.e. Presets I and II. References given in brackets are for the 'right' presets, i.e. Presets III and IV. To avoid confusion it is necessary to emphasise that there are three master dimmers to each preset - the A(C) master dimmer lever which has a red scale moulding; a B(D) master dimmer lever which has a white scale moulding; and the Preset I or II (III or IV) master dimmer lever which has an amber scale moulding.

To select channels to be under the control of the A(C) master with the red scale the SELECT switch must be put down or the SELECT toe push pressed. Both of these energise master relay RL1 which in turn energises couplers RC1/6 (RC11/16). Therefore when the scale of a Preset I or Preset II (III or IV) dimmer lever is pressed the micro-switch within the lever unit can feed through the now closed contacts of RC1/6 (RC11/16) to the coil of the reverser relay RLR.1 etc (RLR.121 etc.) Each time the reverser coil receives a feed the two sets of contacts change-over. Therefore when a scale is pressed once, the bottom pair of contacts will close and so will feed the fixed bar of coupler RC5, 10 (RC15, 20) which is used as a connection point. From this point the feed is sent back to the common bar of couplers RC1-8 (RC17-24) in the Preset Splitter Cabinet. As Preset I(III) master dimmer lever is at full an internal micro-switch within this unit will be closed and will energise relay RL1 in the Preset Splitter Cabinet. This in turn will energise the coils of couplers RC1,3,5,7 and therefore the feed from the fixed bar of coupler RC5, 10 at the Coupler Cabinet will be routed through to the 'red' pilot in the corresponding dimmer lever unit on Preset I. At the same time the coil of relay RL2 (RL3) in the Relay Unit Ref 856 will be fed via the normally closed contact on RC5,10 (RC15,20).

The contacts of RL2 (RL3) therefore close, one pair of contacts completing the connection between common B1,7 (B4,10) which is the output of the A(C) master dimmer lever, and the input connection of the corresponding

Integrator Ref 889 at the Preset Splitter Cabinet. As Preset I(III) master dimmer lever is at full the output of the A(C) master dimmer will be fed through the Integrator to the feed connection of the corresponding dimmer lever unit on Preset I(III). The dimmer lever now has an internal red indication and is under the control of the both the A(C) and Preset I master dimmer levers. In practice other channels are selected in the same way to form an operational group and can be removed from the selection by pressing the dimmer lever scale again which provides another pulse to the reverser relay which therefore reverses the sequence previously described.

At this stage the SELECT switch or push would normally be returned to normal so that inadvertently touching a dimmer lever scale, while resetting a lever, would not alter the selection. The A(C) master dimmer lever would then be faded in to full (10) and then the selection transferred to the corresponding B(D) master dimmer with a white scale, which is normally at full, so as to free the A(C) master dimmer for another group.

The transfer to the B(D) master dimmer is made automatic, but for the present purposes it will be more instructive to assume manual operation for the time being. This is by pressing the push at the top of the B(D) master dimmer lever but an internal limit switch within the lever prevents the function unless the wiper arm is at full. Presuming that this condition is fulfilled the 'park' push energises master relay RL.5 (RL.7) which in turn energises the 'on' coil of remanent relay RL.1 (RL.4) on the Relay Unit Ref 856. through that at present closed pair of contacts on RL.2 (RL.3). The contacts of RL.1 (RL.3) therefore close, one pair of contacts providing a parallel feed to the input connection of the Integrator at the Preset Splitter Cabinet from common B2, 8 (B5,11) which is the output of the B(D) master dimmer lever. Blocking diodes in the Relay Unit prevent feedback from one master dimmer to the other. The Preset I dimmer lever unit is therefore for the moment fed from the Relay Unit by both the A(C) and B(D) master dimmers.

Another pair of contacts on RL1 (RL3) allows the 47½v AC. supply to be fed to the common bar of couplers RC9-16 (RC25-32) in the Preset Splitter Cabinet. As the adjacent relay RL1 is closed this in turn energises the coils of couplers RC 9,11,13,15 and therefore the 'white' lamps in the corresponding dimmer lever unit will illuminate.

When master relay RL5 (RL7) is closed it also feeds, via a blocking diode and a pair of normally closed contacts on RC5/10 (RC15/20), the coil of RL1 (RL2) in the Memory Cabinet; this in turn feed coil MC21 in the Memory Boxes, and also RC25/27 (RC26/28). This results in a feed to all of the normally open contacts of the top set of contacts of the reverser relays RLR1 (RLR.121 etc) and therefore any reverser relays which are already selected receive a feed to their coil. The change-over contacts reverse, breaking the supply to the red pilot in the dimmer scales and releasing RL2 (RL3) in the Relay Unit. The feed from the A(C) master dimmer is therefore disconnected and the dimmer lever potentiometer is fed only from the B(D) master dimmer as described above. The A(C) master dimmer lever is therefore freed and can be returned to zero ready for another group to be selected.

Subsequently it may be necessary to transfer back to the A(C) master dimmer some channels at present held on the corresponding B(D) master dimmer. To do this the channels have to be selected using the SELECT master control as previously described. Then, with the A(C) master dimmer lever at full, the push above the lever is pressed. This energises master relay RL6 (RL8) which in turn feeds the 'off' coil of remanent relay RL1 (RL4) in the Relay Unit through the at present closed pair of contacts on RL2 (RL3) and the 'suicide' contacts protecting its own 'off' coil. As RL1 (RL4) releases the white pilot in the dimmer lever scale is extinguished and the feed from the B(D) master dimmer to the dimmer lever potentiometer is broken.

When the A(C) master is faded to zero the selection will no longer be required and it is therefore cancelled by pressing the push at the bottom of that master lever. This is not interlocked and feeds the coil of RL1 (RL2) in the Memory Cabinet. This, as previously described 'cancels' any reverser relays at that time selected.

Similarly the B(D) master dimmer may be faded to zero and then to remove channels from this group the 'park' cancel push at the bottom of that master dimmer lever is pressed. Providing the internal limit switch is closed this feeds coupler RC4/9 (RC14/19) which in turn energises all the 'off' coils of the 'park' relays RL1 (RL4) in the Relay Units.

The pushes above and below the B and D master levers are interlocked to prevent a conflicting result. These interlocks can be short-circuited by pressing the OVERRIDE toe push which then feeds the pushes direct via blocking diodes.

Channels can be grouped direct to the B(D) master dimmer by using the INDIV. PARK switch instead of SELECT. The INDIV PARK switch energises master relay RL3 which in turn energises couplers RC2/7 (RC12/17) which allows the micro-switch in the dimmer lever scale to feed the 'on' coil of the'park' relay RL1 (RL4) of The Relay Unit directly.

Similarly channels can be removed from the B(D) master dimmer without reverting to the A(C) master by using the INDIV TRIP switch. This switch energises master relay RL4 which in turn energises couplers RC3/8 (RC13/18) which allow the micro-switch in the dimmer lever scale to feed the 'off' coil of the park relay RL1 (RL4) of the Relay Unit directly.

The HOLD switches allow the reverser relays RLR1 etc (RLR.120 etc) to be operated without affecting the grouping to the A or C master dimmers. The HOLD LEFT (HOLD RIGHT) switch energises coupler RC33(34) this in turn feed a sustainer supply to all relays RL2 (RL3) of the Relay Unit at that time energised. A normally open subsidiary contact also closes to allow the HOLD switch to alsofeed couplers RC5/10 (RC15/20). These normally closed couplers therefore open and break the feed from the reverser relays RLR1 etc (RLR.121 etc) to the coils of relays RL2 (RL3) of the Relay Unit. A normally open subsidiary contact also closes to provide another feed, via a blocking diode to couplers RC33(34). When the HOLD switch is returned to normal, coupler RC5/10 (15/20) therefore returns to normally closed before the sustainer supply via the contacts of coupler RC33(34) is removed.

SETTING AND RECALLING MEMORY GROUPS.

To store a selection for subsequent recall the PRESETTER toe push must be pressed. This energises the coil of relay RL3 in the memory cabinet. A pair of contacts on this relay close to energise the coils of the pair of wire-contact relays within the memory box. The operation of the pair of wire-contact relays cause the negative supply to the rear coils of the memory couplers, MC1 - MC20, to be removed but at the same time the corresponding front coils are connected to negative. On the wiring diagram the rear coil and contacts of the memory couplers are drawn to the right of the corresponding front coils.

While the PRESETTER push is pressed a 'left' memory push, for example 3, is pressed. This feeds a diode matrix DM3 which allows the coil of the corresponding wire-contact relay MCR3 to be energised. The contacts therefore close and feed the coils of memory coupler MC3 but only the front coil can energise as the rear coil is deprived of negative as described above. The front contacts of each horizontal latch bar will therefore be pulled down out of the notches. The contacts of relay MCR are duplicated for the connections to the second memory box.

At the same time the diode matrix DM3 will allow the 'left' ('right') memory push 3 to feed, via terminal C (E) to the centre of a set of change-over contacts on relay RL3 in the memory cabinet. This relay is already energised so that the feed is passed through the normally open, but now closed, contact to energise the coil of relay RL4 (RL5) in the memory cabinet. The contacts of relay RL4 (RL5) close and feed coupler coil RC 29/31 (RC 30/32) in the coupler cabinet. These contacts close and therefore any reverser relay RLR.1 etc (RLR.121 etc) which is selected and feeding the red pilot in the dimmer lever scale also feeds through the now closed contacts of coupler RC 29/31 (RC 30/32) to the like-numbered horizontal latch bar coils in the memory boxes of the memory cabinet. The latch bars corresponding to the channels selected are therefore displaced to the left.

When the memory push is released the front memory coupler coil MC3 is de-energised so that the front contacts spring upwards into the notch above them at that time. Because the latch bars of selected channels are displaced to the left the contacts will lodge in the 'on' notch of selected channels, but the 'off' notch of channels not selected. At the same time the feed to the coil of relay RL4 (RL5) will be removed, but both relay RL4 and relay RL5 have coil slugs so that they are slow to release. This provision ensures that couplers RC 29/31 (RC 30/32) do not revert to normally open, thereby removing the feed to selected latch bar coils, until the front contacts in the memory box have been captured in a notch.

When the selected latch bar coils are de-energised the latch bars spring back to the right but the contacts captured in the 'on' notches also travel to the right.

The need for the diode matrix arises from the fact that a 'left' memory push and a like-numbered 'right' memory push both operate the same memory coupler coil MC but the routing of the information to be stored and the recall of this information (described below) must be so that the 'left' push is associated the 'left' reverser relay RLR.1, etc and the 'right' push with the 'right' reverser (RLR.121 etc.).

The PRESETTER push is of course released after a memory path or paths have been set. It is an operational requirement that a memory push is released prior to the release of the PRESETTER push.

To recall a stored selection the 'left' (or 'right') memory push is pressed, without PRESETTER, this feeds to diode matrix DM, relay MCR, and the memory coupler coils MC as described previously but, as the wire-contacts relays in the memory boxes are not now energised, the rear coils are energised. The rear coil pulls down the rear of the wire contacts onto a grid and therefore the contact is fed through to the front of the box where it is captured in either an 'on' or an 'off' notch. All the 'on' notches on a latch bar are commoned as are all the 'off' notches. The 'on' connection is connected to the common fixed bar of couplers RC 21/24 in the coupler cabinet, and the 'off' connection to the common fixed bar of couplers RC 25/28.

At the same time the diode matrix DM will allow the 'left' ('right') memory push to feed, via terminal C (E), the centre contact of a set of change-over contacts on relay RL3 in the Memory Cabinet. This relay is not now energised so that feed is passed through the normally closed contact to energise the coil of relay RL6 (RL7) in the memory Cabinet. One pair of contacts on relay RL6 (RL7) close to feed coupler coil RC 21/23 (RC 22/24). These contacts close and therefore allow 'on' information from the memory box to feed to any 'left' ('right') reverser relay coils RLR.1 etc (RLR.121 etc) that at that moment are 'off'.

Another pair of contacts on relay RL6 (RL7) close and, providing the contacts of the Add relay RL8 are normally closed, feed coupler coil RC 25/27 (RC 26/28). These contacts close and therefore allow 'off' information from the memory box to feed to any 'left' ('right') reverser relay coils that are at the moment are 'on'.

A further pair of contacts on relay RL6 (RL7) feed to the Cancel Unit providing RL8 is not energised. This feed to the Cancel Unit provides a pulse which initiates the cancelling of the lamp indication of the memory push last pressed.

However if the ADD push is pressed prior to a memory push the ADD push will energise relay RL8 in the memory cabinet. The normally closed contacts will open and prevent a feed to RC 25/27 (RC 26/28). This will prevent 'off' information from the memory box feeding to the reverser relay coils and therefore the combination stored on a memory path will be added to any existing selection instead of replacing it. When relay RL8 is energised it also prevents the contacts of RL6 (RL7) feeding the Cancel Unit.

There is one of these printed circuit cards to each memory path, the function of which is to provide the indication of the last memory push pressed. As there are two memory pushes to each memory path the basic circuit is duplicated on each card. The edge connector for each Double Flip Flop is used as the connection point for all the wiring between the memory pushes at the control desk and the Memory Cabinet Ref.879. Pins 3 and 4 are commoned on the printed circuit and so when the card is inserted the common feed to the internal lamps of the pair of memory pushes is completed. Pins 15, 16 and 17 are also commoned on the printed circuit.

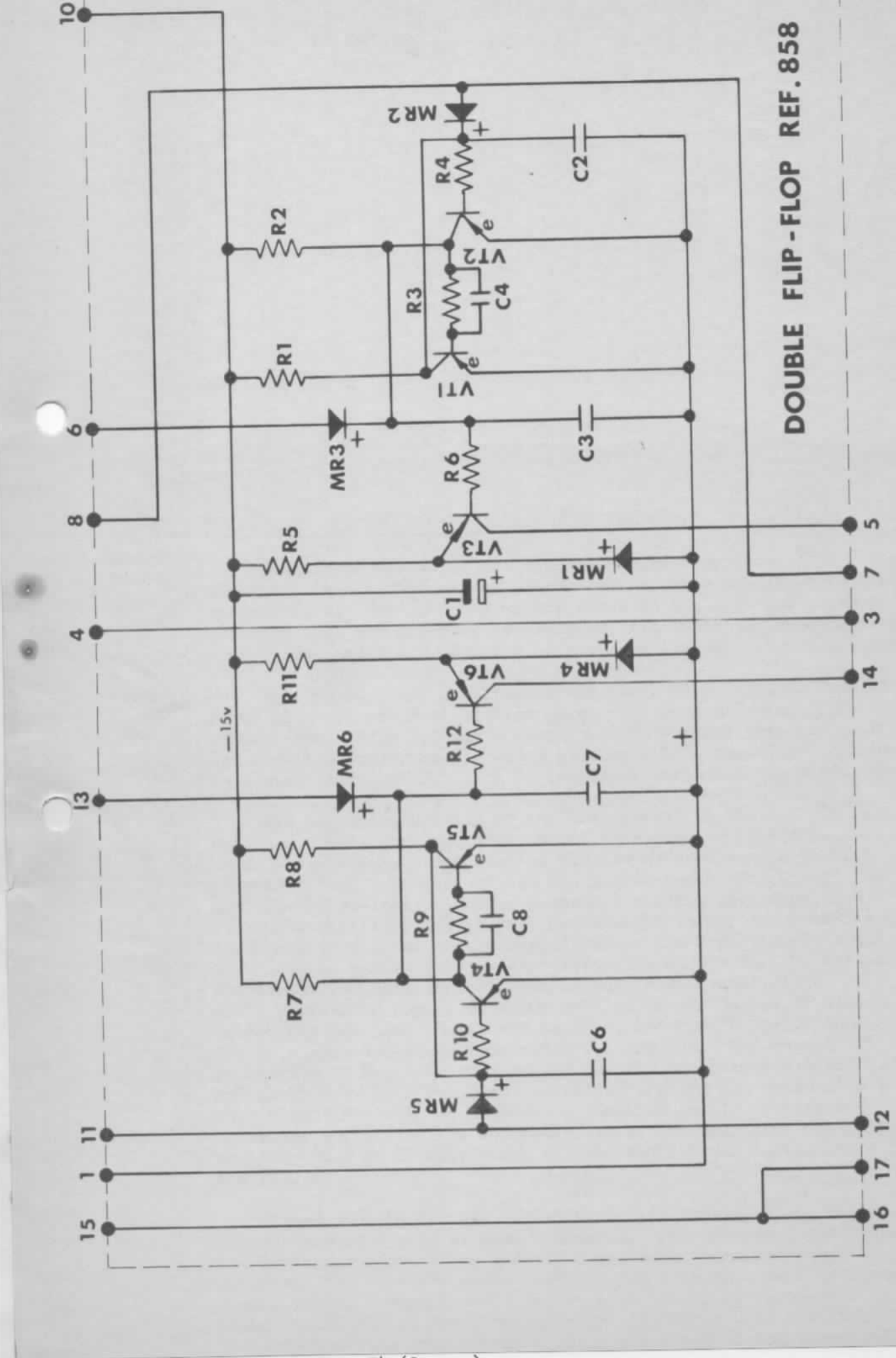
Pins 11 and 12 (7 and 8) are also commoned but in addition provide the 'on' input to transistors VT4 and VT5 (VT1 and VT2) which are connected as a bi-stable switch. Pin 13 (6) is the 'off' input from the Cancel Unit. Transistor VT6 (VT3) switches the output to the lamp via pin 14 (5). The power supplies for the printed circuit card are connected to pin 1 (technical earth) and Pin 10 which is a -15v DC. stabilized supply derived from a Ref.823 Stabilizer. Details of this latter unit will be found in the System CRD/R Instruction Manual.

CANCEL UNIT.

This unit also has the same circuitry duplicated for each set of memory pushes. When a memory push is pressed, in addition to feeding the diode matrix DM as described previously, it causes the Flip-Flop circuit to be biased to switch on the internal lamp of that memory push. At the same time the C (E) connection of the diode matrix DM normally completes a feed to the appropriate half of the Cancel Unit via relay RL6 (RL7) as previously described. The Cancel Unit thereupon produces a pulse to all the corresponding halves of the Flip-Flop Units. This is sufficient to switch 'off' the bi-stable switches, and therefore extinguish the internal lamps of the memory pushes, providing the Flip Flop is not receiving an 'on' input at that moment. If the ADD push is pressed when a memory push is pressed, this energises relay RL8 and, as well as other functions, prevents the feed to the Cancel Unit. When a Wipe Off (W/O) push is provided this provides a feed in parallel with the feed to the Cancel Unit.

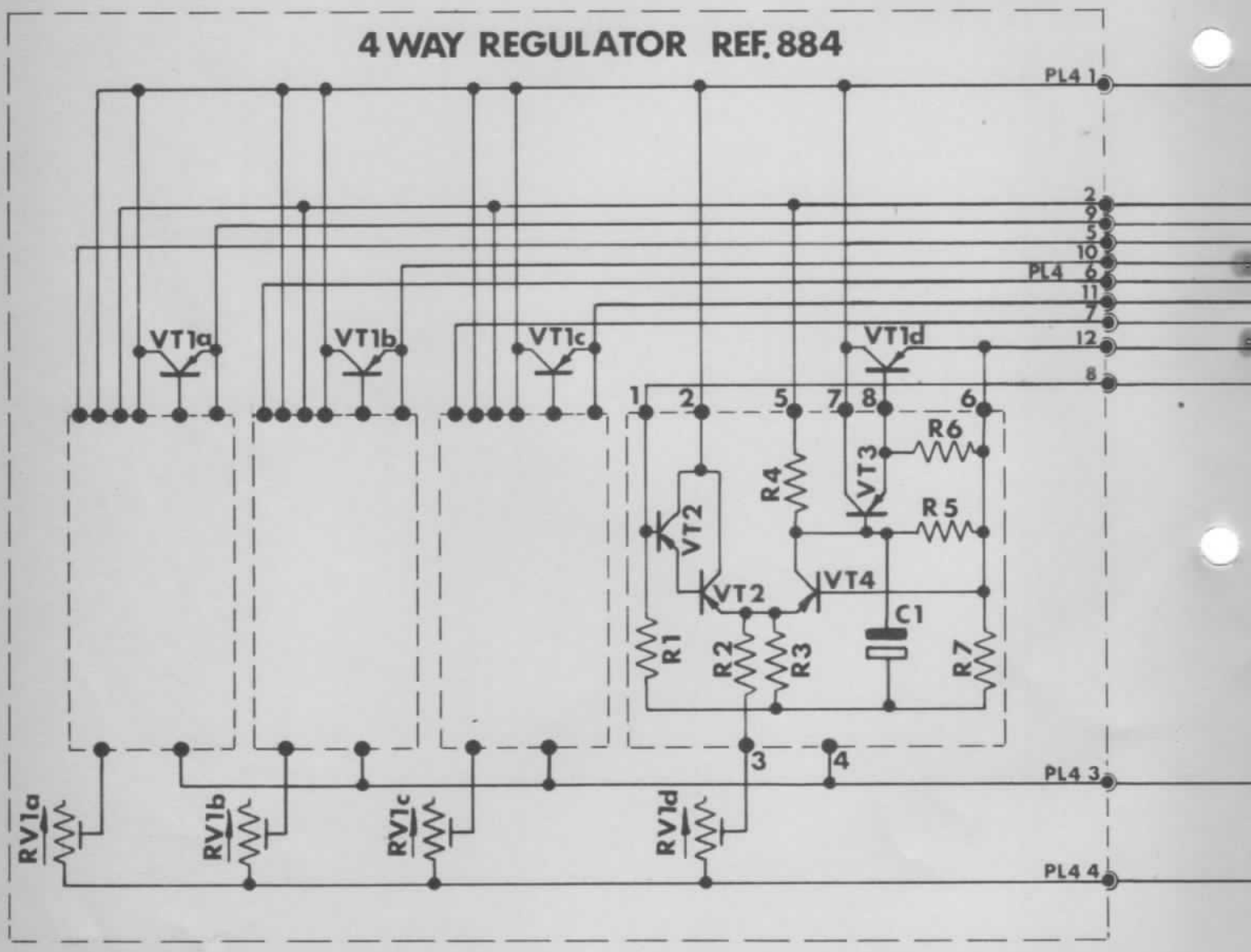
THE Z WING

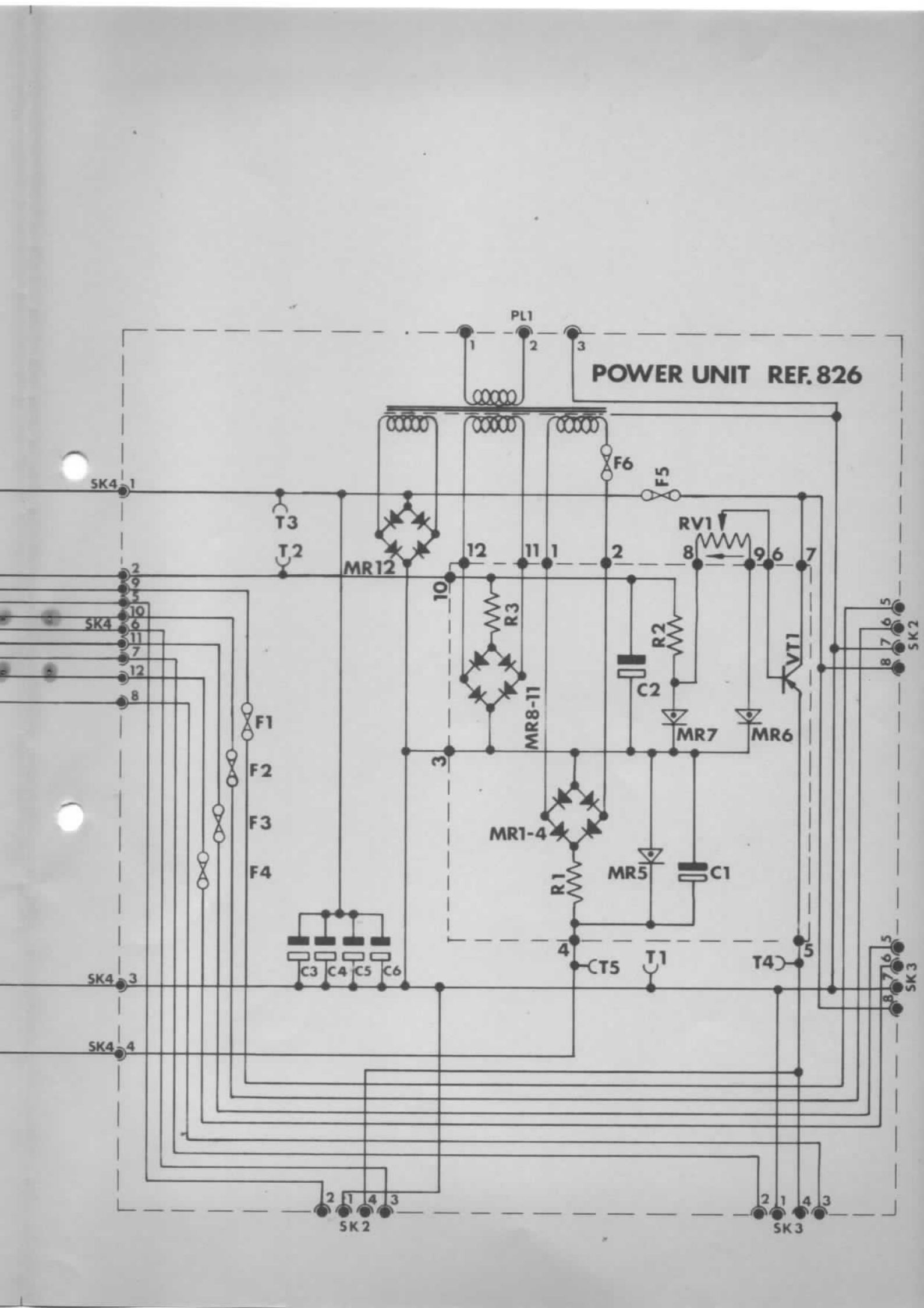
This is an auxilarly control panel with a dimmer lever for each control channel. These dimmer levers are not matched to the same curve as those at the control room, but feed in System CRD/R 'dimmer' connections in parallel with the feed from the four dimmer presets in the control room. The Z Wing has a Ref 826 Power Unit and a Ref 884/1 1-way Regulator to provide the necessary power supplies to the dimmer lever potentiometer. The output of the Regulator is not controlled by a master dimmer lever. The power supplies to the Z Wing Power Unit are normally derived from terminals A,B,E of Power Unit A on Dimmer Rack 8 (Channels 210-240) but are subject to an overriding switch on the master desk. For emergency use a key switch allows the Z Wing Power Unit to be fed, via a integral transformer, from a load supply not subject to any one particular dimmer rack.

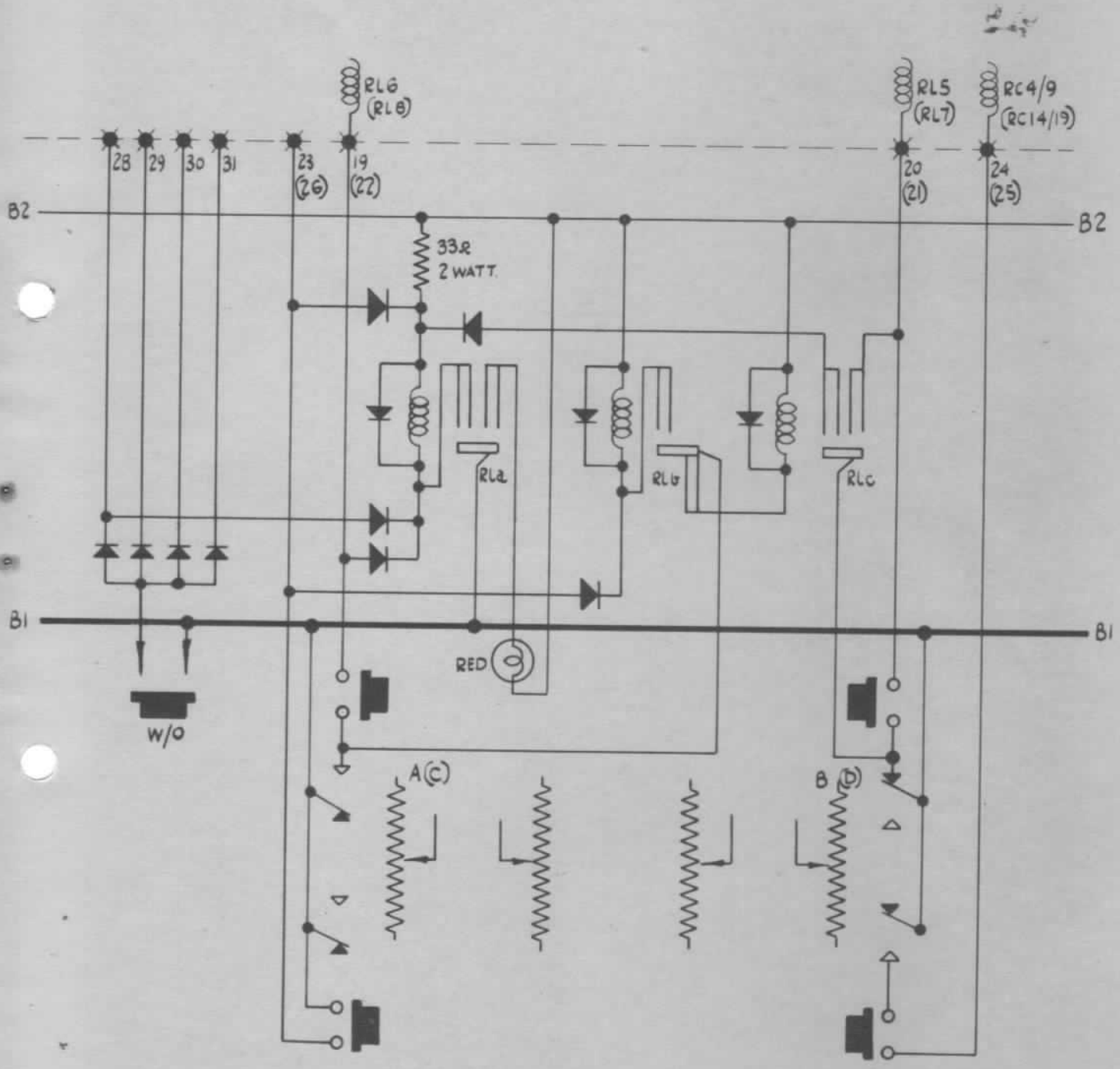



on fuses F1 - F4 (2 amps)

The regulator unit Ref 884 in its standard form has four independently controlled DC amplifiers each with a preset potentiometer RV1 to adjust for zero output when there is zero input. Each amplifier is on a separate printed circuit board with the exception of the


4 WAY REGULATOR REF. 884
PL4 1
2
9
5
10
PL4 6
11
7
12
8
VT1a
VT1b
VT1c
VT1d
1
2
5
7
8
6
R6
VT3
R4
R5
VT2
VT2
VT4
C1
R1
R2
R3
R7
3
4
PL4 3
PL4 4
RV1a
RV1b
RV1c
RV1d


POWER UNIT REF. 826
PL1
1
2
3
SK4
T3
T2
MR12
F6
F5
RV1
R3
R2
C2
VT1
MR8-11
MR7
MR6
F1
F2
F3
F4
MR1-4
R1
MR5
C1
C3
C4
C5
C6
T5
T1
T4
SK2
SK3


RL6
(RL8)
RL5
(RL7)
RC4/9
(RC14/19)
28
29
30
31
23
(26)
19
(22)
20
(21)
24
(25)
B2
B2
33R
2 WATT
RLa
RLb
RLc
B1
B1
RED
W/O
A (C)
B (D)

AUTOMATIC PARK CIRCUITRY.

This circuitry is supplementary and is connected in parallel with the manual controls previously described The additional components are mounted within the master desk. The circuit shown opposite is duplicated for the C and D master dimmer levers. The diodes shown are for blocking purposes

When a left memory push is pressed this provides a feed to the Left Cancel Unit as previously described. The contacts of the Wipe Off (W/O) push are in parallel with the input to the Left Cancel Unit, as previously described, and therefore the signal to initiate the sequence of Automatic Park is derived locally in the master desk from the contacts of the Wipe Off push. Therefore whenever a left memory push is pressed this provides a feed to wire contact relay RLa, the contacts of which close, sustain the coil and feed the red indicator lamp adjacent to the A(C) (red scale) master dimmer lever. When this master dimmer lever is brought to full, the internal micro switch closes and this feeds the armature of a wire-contact changeover relay RLb. Through the normally closed contact this latter feed energises the coil of wire-contact relay RLc. The armature of relay RLc is fed from the micro switch which is closed only when the B(D) (white scale) master dimmer lever is at full and therefore in these circumstances a feed will be provided to bypass the 'Park' push and initiate the park operation as previously described. At the same time another contact on relay RLc provides a feed which short circuits the sustained coil of relay RLa which therefore opens, and in so doing breaks the supply to the red indicator light.

Part of the park operation is to energise memory coupler MC21 in order to cancel the appropriate reverser relays RLR and the feed to do this is in parallel with the 'Cancel' push mounted at the bottom of the A(C) master dimmer lever. This parallel feed is used to energise the coil of relay RLb, which then sustains, and breaks the feed to the coil of relay RLc so that the feed which bypasses the 'Park' push is broken as soon as the park operation has been completed. The same parallel feed also short circuits the sustained coil of relay RLa as described above. This is to ensure that if the 'Cancel' push is pressed it also cancels the red indication.

If the 'Transfer' push over the A(C) master dimmer lever is pressed this also provides a parallel feed to energise relay RLa, and therefore provides the red indication, but the automatic park sequence cannot continue as in these circumstances relay RLb would be sustained thereby preventing RLc from being energised..

| | FUSE RATINGS | |
|---|---|---|
| Coupler Cabinet Ref 857 | F1 - F12 | 2.5 amp $\frac{5}{8}$ x 3/16th-in. |
| | F13 -F40 | 7 amp $\frac{5}{8}$ x 3/16th-in |
| Memory Cabinet Ref 879 | F11 | 7 amp $\frac{5}{8}$ x 3/16th-in |
| Power Unit Ref 826 | F1 - F5 | 2.5 amp $\frac{5}{8}$ x 3/16th-in |
| | F6 | 350 m/amp $\frac{5}{8}$ x 3/16th-in |
| Preset Splitter Cabinet Ref 909 | F1 - F4 | 7 amp $\frac{5}{8}$ x 3/16th-in |
| | F5 | 2.5 amp $\frac{5}{8}$ x 3/16th-in |
| | F6,F7 | 0.5 amp $\frac{5}{8}$ x 3/16th-in |
| | F8 - F15 | 100 m/amp $\frac{5}{8}$ x 3/16th-in. |

CAE/4.

# SYSTEM C/AE4

## TROUBLE SHOOTING.

Determine the full extent of any trouble as the total number of the channels concerned and which preset, or which facility, is affected provides a valuable clue to the source of the fault. The circuitry is purposely divided into various multiples to limit the extent of a fault.

### ALL CHANNELS AND ALL PRESETS.

Complete loss of light, except from Z wing.

Check DBO switch, check DBO relay RL5 at Splitter Cabinet is not energised. Check SK1 at Splitter Cabinet. Check PL1, SK2 (short circuiting plug) and SK4 on Power Unit 3. Check Power Unit A circuit breaker on Dimmer Rack 5 and also F.1 (7 amp) on that Power Unit A.

Complete loss of 'red' and 'white' indication.

Check F.5 (2.5 amp) at Splitter Cabinet.

### ALL CHANNELS AND PAIR OF PRESETS.

Complete loss of light on presets I and II also A and B masters.

Check Power Unit A circuit breaker on Dimmer Rack 1 and also F.1. (7 amp) on that Power Unit A. Check PL1 and SK4 on Power Unit 1 at Splitter Cabinet. Check F.6 (350 milli-amp) on Power Unit 1.

Complete loss of light on presets III and IV also C and D masters.

Check as above but on Dimmer Rack 2 and on Power Unit 2 at Splitter Cabinet.

### 120 (HALF) CHANNELS AND ALL PRESETS

Loss of Select, Park, Trip and Cancel facilities.

Check F.40 (7 amp) and SK1 at appropriate Coupler Cabinet.

Loss of 'red' indication cancel, memory setting and recall facilities.

Check F.39 (7 amp) and SK2 at appropriate Coupler Cabinet also F11 or F12 (7 amp) at appropriate Memory Cabinets.

### 120 (HALF) CHANNELS AND PAIR OF PRESETS

Loss of Select, Park, Trip and Cencel facilities.

Check F.37 (7 amp) at appropriate Coupler Cabinet if presets I and II affected. If presets III and IV affected check adjacent F.38 (7 amp)

Loss of 'white'indication.

Check F.10 on Power Unit TRX 374 at base of appropriate Memory Cabinet.

### ALL CHANNELS AND ONE PRESET ONLY

Loss of 'red' and 'white' indication

Check F.1 (7 amp) at Splitter Cabinet if preset I, check F.2 if preset II, check F.3 if preset III, check F.4 if preset IV. Is the micro-switch operated when the appropriate master dimmer lever leaves thebottom of the scale.?

for the faulty function in the appropriate Coupler Cabinet or Memory Cabinet.

30 CONSEQUETIVELY NUMBERED CHANNELS AND ALL PRESETS

See System CRD/R Trouble Shooting.

10 CONSEQUETIVELY NUMBERED CHANNELS

Loss of Select and Cancel facilities.

Check corresponding group fuse in the series F.25 - 36 (7 amp) at the appropriate Coupler Cabinet.

Loss of Park, Trip and transfer facilities.

Check corresponding group fuse in the series F.13-24 (7 amp) at the appropriate Coupler Cabinet.

Loss of 'white' indication

Check corresponding group fuse in the series F1-12 (2.5 amp) at the appropriate Coupler Cabinet.

6 CONSEQUETIVELY NUMBERED CHANNELS AND ALL PRESETS

See System CRD/R Trouble Shooting

5 CONSEQUETIVELY NUMBERED CHANNELS AND PAIR OF PRESETS

Loss of control on presets I and II

Check appropriate 5 way Integrator Board in the series EC1-24 (channels 1-120) or EC49-72 (channels 121-240) at Splitter Cabinet and also the power supplies to pins 1-4 on the edge connector for these boards.

Loss of control on presets III and IV

Check as above but in the series EC25-48 or EC73-96

3 CONSEQUETIVELY NUMBERED CHANNELS AND ALL PRESETS

See System CRD/R Trouble Shooting

SINGLE CHANNEL AND ALL PRESETS

Complete loss of light including from Z wing

See System CRD/R Trouble Shooting.

Complete loss of light, excluding from Z wing

Check plug and socket connecting to appropriate Relay Unit Ref.856 at Relay Cabinet.

SINGLE CHANNEL AND PAIR OF PRESETS

Loss of Select facility including 'red' indication

Check appropriate contacts on Coupler RC1 or 6 at Coupler Cabinet if on preset I and II; Coupler RC11 or 16 if presets III and IV. Check also appropriate reverser relay RLR.

Loss of Select facility excluding 'red' indication

Check appropriate contacts on Coupler RC5 or 10 if on preset I and II; Coupler RC15 or 20 if presets III and IV.

Loss of Individual Park facility.

Check appropriate contacts on Coupler RC2 or 7 if on preset I and II, Coupler RC12 or 17 if presets III and IV.

Loss of Individual Trip facility

Check appropriate contacts on Coupler RC3 or 8 if on presets I and II; Coupler RC13 or 18 if presets III and IV.

Loss of 'white' cancel facility.

Check appropriate contacts on Coupler RC4 or 9 if on presets I and II; Coupler RC14 or 19 if presets III and IV.

Loss of 'red' cancel facility.

Check appropriate contacts on Coupler RC25 or 27 if on preset I and II; Coupler RC26 or 28 if presets III and IV. Check also appropriate reverser relay RLR.

Failure to set on all memory push paths.

Check appropriate contacts on Coupler RC29 or 31 if on preset I and II; Coupler RC30 or 32 if on preset III or IV.

Failure to recall on all memory push paths.

Check appropriate contacts on Coupler RC21 or 23 if on preset I and II; Coupler RC22 or 24 if on presets III or IV. Check also appropriate reverser relay RLR.

SINGLE CHANNEL AND ONE PRESET ONLY

Loss of Select, Individual Park or Trip facilities.

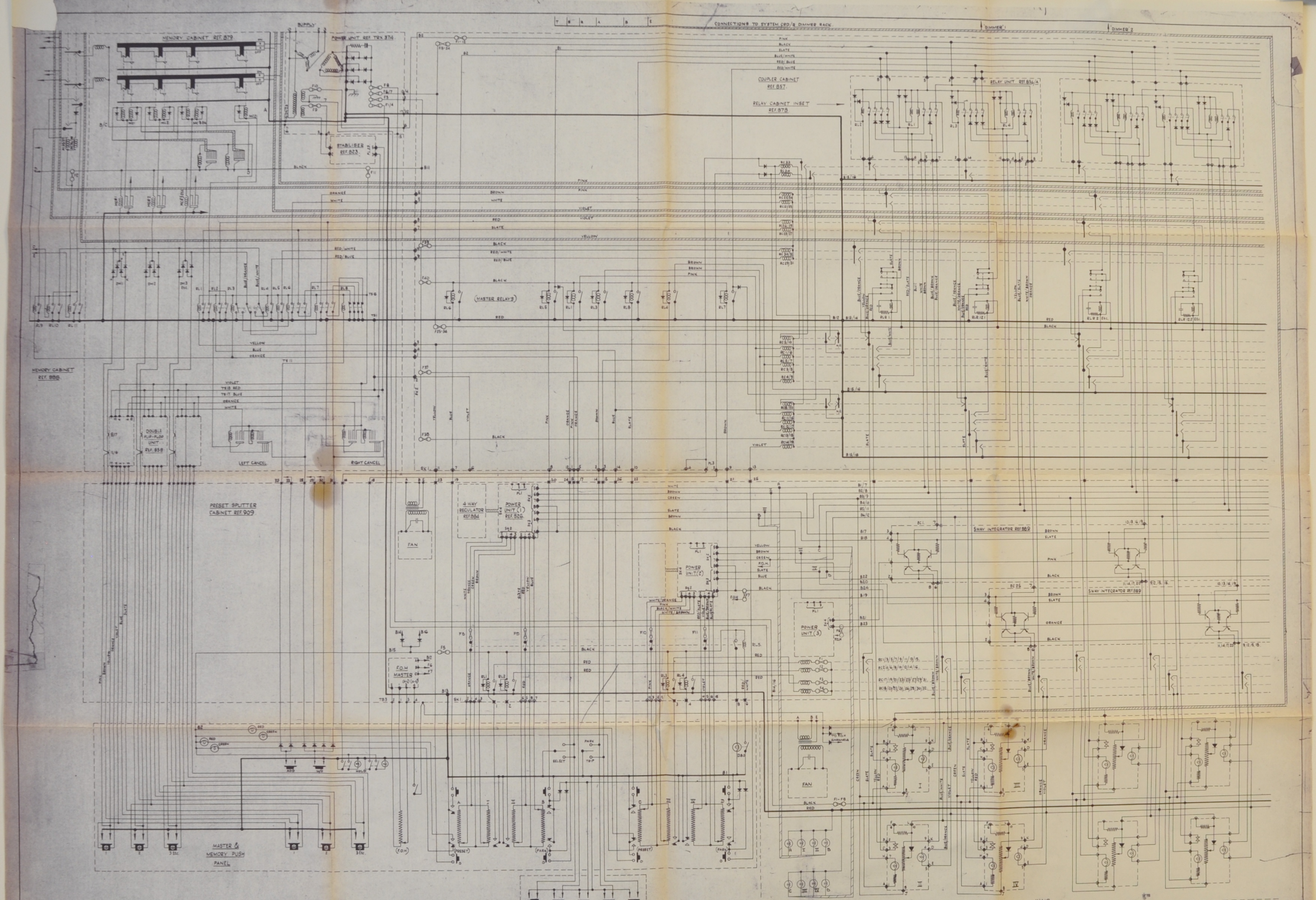
Check micro switch within dimmer lever unit, by substituting another unit.

Loss of 'red' indication

Check appropriate contacts on Coupler RC1,3,5 or 7 at Preset Splitter Cabinet if preset I, Coupler RC.2,4,6 or 8 if preset II; Coupler RC.17,19,21 or 23 if preset III; Coupler RC.18,20,22 or 24 if preset IV. Also check 'red' lamp within dimmer lever unit by substituting another unit.

Loss of 'white' indication

As above but Coupler RC9,11,13 or 15 if preset I; Coupler RC. 10,12,14 or 16 if preset II; Coupler RC.25,27,29 or 31 if preset III; Coupler RC.26,28,30 or 32 if preset IV.




THE STRAND ELECTRIC & ENGINEERING Co LTD
29, KING STREET, COVENT GARDEN.
LONDON, W.C.2.

| REVISION 1. | DATE 10-7-64 | REVISION 2 | DATE 28-8-64 | REVISION 3. | DATE 31-1-65 |
|---|---|---|---|---|---|
| DRAWN. | CHECKED. | DRAWN. | CHECKED. | DRAWN. | CHECKED. |
| DIODES ON DIMMER UNITS WERE SHOWN FACING OTHER WAY. | | MODIFIED ON COMPLETION OF JOB | | WING PILOTS CONNECTIONS & F8-11 FUSES ADDED. MASTER LIMIT WIRING CORRECTED. | |



| | |
|---|---|
| SCALE | |
| DRAWN | R.J.D.A.N. |
| CHECKED | |
| APPROVED | |
| MATERIAL | |
| DATE | |
| TOLERANCES:- DECIMALS ± .005" FRACTIONS ± 1/64 UNLESS OTHERWISE STATED | |
| FINISH - | |

TITLE: SYSTEM C/AE/4
COVENT GARDEN.

ISSUE 1. 2. 3. 4.

DWG. Nº T392A

Higher resolution image follows but some small errors in wiring alignment.

MEMORY CABINET REF. 879

SUPPLY

POWER UNIT REF. TRX 374

STABILISER REF. 823

CONNECTIONS TO SYSTEM C/D/2 DIMMER RACK

DIMMER 1

DIMMER 2

COUPLER CABINET REF. 857

RELAY CABINET INSET REF. 878

RELAY UNIT REF. 856/A

(MASTER RELAYS)

MEMORY CABINET REF. 888

DOUBLE FLIP-FLOP UNIT REF. 858

LEFT CANCEL

RIGHT CANCEL

PRESET SPLITTER CABINET REF. 909

4 WAY REGULATOR REF. 884

POWER UNIT (1) REF. 826

POWER UNIT (2)

POWER UNIT (3)

FAN

F.O.H MASTER

MASTER & MEMORY PUSH PANEL

5 WAY INTEGRATOR REF. 889

WING PILOTS

WING

SELECT PRESETTER OVER RIDE PARK TRIP

THE STRAND ELECTRIC & ENGINEERING Co LTD
29, KING STREET, COVENT GARDEN,
LONDON, W.C.2.

| REVISION 1. | DATE 10-7-64 | REVISION 2 | DATE 26-8-64 | REVISION 3. | DATE 6-1-65 |
|---|---|---|---|---|---|
| DRAWN. | CHECKED. | DRAWN. | CHECKED. | DRAWN. L.Cook | CHECKED. RW |
| DIODES ON DIMMER UNITS WERE SHOWN FACING OTHER WAY. | | MODIFIED ON COMPLETION OF JOB | | WING PILOTS CONNECTIONS & F8-11 FUSES ADDED. MASTER LIMIT WIRING CORRECTED. | |



| SCALE | DATE | TOLERANCES |
|---|---|---|
| DRAWN R.W.S. | | DECIMALS ± .005 FRACTIONS ± 1/64 |
| CHECKED | | UNLESS OTHERWISE STATED |
| APPROVED | | FINISH — |
| MATERIAL — | | |

TITLE: SYSTEM C/AE/4 COVENT GARDEN.

ISSUE 1. 2. 3. 4.

DWG. Nº T392A