MCM DIMMERS

TECHNICAL HANDBOOK

TECHNICAL INFORMATION

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Rank Strand

MCM DIMMERS

TECHNICAL HANDBOOK

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SCOPE

This handbook contains information normally required for installation of Rank Strand MCM Dimmer Racks.

SERVICE ASSISTANCE

For assistance with servicing or maintenance, please contact the nearest branch, agent or associate company (see list at the end of this handbook) and state the Order Reference, Equipment Reference or other relevant information as well as an indication of all fault symptoms encountered. Refer to the current Rank Strand Electric spares price list for details of spare parts and fuse links available for this equipment.

The information in this handbook has been carefully reviewed and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies.

The material in this leaflet is subject to change without notice.

1. MCM DIMMER RACKS - INSTALLATION INSTRUCTIONS

1.1 Rack Description

The standard MCM rack contains a fuse panel with incoming supply connections, five levels of dimmer crates, and a fan tray. The dimensions of the rack are shown in Dwg. 1B 20486. The basic layout of the rack is shown in Dwg. 1A 22352. Gland plates are provided at the top and bottom of the racks, the positions of which are shown in the above drawings. These plates are removable to aid the cutting of holes by the installing Electrician.

The standard rack requires rear access, to enable the supply and load connections to be made. Ensure that enough room is left for the rear panel to be opened.

It is suggested that the racks are joined together in bays whenever possible, using the kits provided.

1.2 Mounting

It is preferable to mount groups of dimmer racks together in bays. The racks should be bolted together using the kits provided (8 screws, 4 spacers and 8 washers per rack). The side panels of the rack should be removed if fitted, except for the two ends of a row of racks. The cage nuts are mounted in the side punched uprights on the left hand side of the rack, and the next rack bolted to it using spacers, screws and washers.

Because of the use of forced ventilation and the switching of large currents through inductors, it is preferable not to mount dimmer racks in an acoustically live position.

1.3 Ventilation

MCM Dimmer Racks are force-ventilated by four fans mounted on a tray below all the dimmer crates. The air is taken in through louvres punched in the front of the tray. Care must be taken to ensure that the air inlet is not blocked.

MCM Racks are designed such that the inlet air temperature should not exceed 35°C (95°F). Air conditioning may be necessary in some locations to maintain the ambient temperature below 35°C. A suitable guide for the amount of cooling required is to assume the maximum heat dissipation from a standard rack is 3 kW.

1.4 Supply Connections

The rack is provided with busbars for three phases, Neutral and Earth. These are mounted behind the fuse panel. Each busbar is provided with a stud or clamp for the incoming connections. The busbar positions are shown on Dwg. 1A 22352. From left to right, the busbars are Neutral, P3, P2, P1, and Earth, and are marked N, T, S, R, and E.

It is important to ensure that a proper earth connection is made to the earth busbar, and not to rely on trunking/conduit for continuity.

NOTE: High voltage insulation testers must not be used on this equipment, unless all dimmer modules have been removed, and the control system has been disconnected.

1.5 'Load' Connections

The 'load' connections are made at the rear of each dimmer crate. See Dwg.s 1B 21008 and 1B 21945 for details of the layout.

It is suggested that for a neat installation, the 'load' wires are taken up or down the right hand side of the rack, looking from the rear.

It is important always to run the neutral of a load circuit near to the 'load' line, i.e. in the same trunking run etc., otherwise large stray magnetic fields may be created which will cause the trunking/conduit to vibrate or radiate interference.

NOTE: High voltage insulation testers must not be used on this equipment, unless all dimmer modules have been removed, and the

control system has been disconnected.

1.6 Control Connections

The control connections are made to the right hand terminal block on the rear of each dimmer crate.

The Technical Earth connections on each crate must be linked together somewhere in the system. It is important to ensure that loops are not formed by linking the Technical Earth connections together at the control desk and at the racks.

The Technical Earth must be connected to Mains Earth at a single point in the system, but at only one place. In recent Rank Strand control systems, a Technical Earth/Mains Earth link is made in the desk.

The recommended cable for control lines is a Ø.5 mm multicore, insulated to 415V, as it can then be run with the Mains and Load wiring, subject to the local authority load regulations. Rank Strand can supply suitable 12-core cable - code no. 35 6Ø1 11.

The terminal blocks on the crate are labelled 1 - 12 and TE. TE is the Technical Earth and the control lines are numbered in numerical order for the dimmer crate. Note that for a crate of MCM 5Ø modules, terminals 1 - 6 are used, and for a crate of MCM 1ØØ modules, terminals 1 - 3 are used.

It is suggested that for a neat installation, the control cables are taken up or down the right hand side of the rack, looking from the rear.

1.7 Sound Installations

Waveform switching, as is provided by thyristor dimmers, can reveal unsuspected earth loops on associated sound systems, in the form of interference. Careful inspection of the sound system earthing and screening may be required to remedy any earth loops discovered in

this way.

High impedance low level microphone lines are also susceptible to interference. These should never be used with a long length of line. High impedance inputs of a mixer or amplifier should be short-circuited, or switched off when not in use.

Wherever possible, low impedance balanced microphone lines, as provided by moving coil microphones, or high level low impedance balanced microphone lines, as provided by condenser microphones, should be used, especially if long cable runs are required.

2. MCM DIMMER MODULES - MAINTENANCE

2.1 General

MCM modules are available in three power ratings:

MCM 25	Dual	2.5kW
MCM 50	Single	5 kW
MCM 100	Single	10 kW

MCM 100 modules are twice the width of MCM 50 and Dual MCM 25 modules.

MCM modules are available in open and closed loop forms with a variety of trigger cards. Designations for the module types are:-

Module	Designation	Trigger Card
Open loop S-law	/S	Ref 1275
Closed loop sqare law	/CS	Ref 1272
Closed loop linear law	/CL	Ref 1273

The above modules are all hard firing, enabling very low voltage loads to be controlled by the dimmer. In addition to the above modules there exists a pulse fired version, normally supplied with an open loop S-law trigger circuit. This dimmer is designated /P. There is also an MCM Non-Dim module, designated /ND.

MCM Dimmers and Components

Dimmer/Component		Product Code
MCM Dimmers - 2.5kW		
MCM 25/CL	2 x 2.5kW, Closed loop, Linear law.	Ø1 325 1Ø
MCM 25/CS	2 x 2.5kW, Closed loop, Square law.	Ø1 325 29
MCM 25/S	2 x 2.5kW, Open loop, Square law.	Ø1 325 37
MCM 25/P	2 x 2.5kW, Open loop, Pulse fired.	Ø1 325 45
MCM Dimmers - 5kW		
MCM 5Ø/CL	5kW, Closed loop, Linear law.	Ø1 35Ø 15
MCM 5Ø/CS	5kW, Closed loop, Square law.	Ø1 35Ø 23
MCM 5Ø/S	5kW, Open loop, Square law.	Ø1 35Ø 31
MCM 5Ø/P	5kW, Open loop, Pulse fired.	Ø1 35Ø 4T
MCM Dimmers - 1ØkW		
MCM 1ØØ/CL	1ØkW, Closed loop, Linear law.	Ø1 4ØØ 13
MCM 1ØØ/CS	1ØkW, Closed loop, Square law.	Ø1 4ØØ 21
MCM 1ØØ/S	1ØkW, Open loop, Square law.	Ø1 4ØØ 3T
MCM 1ØØ/P	1ØkW, Open loop, Pulse fired.	1Ø 4ØØ 48

MCM Dimmers and Components (cont.)

Dimmer/Component	Product Code
MCM Dimmer Racks	
Rack for 5 Crates, Reyrolle fuses.	06 315 07
Rack for 5 Crates, Siemens fuses.	06 320 07
Rack for 3 Crates, Reyrolle fuses.	06 325 04
Rack for 3 Crates, Siemens fuses	06 325 12
Dimmer Rack Components	
Bus-bar, 600 Amp.	06 340 01
Bus-bar, 400 Amp.	06 340 1T
Bus-bar, 250 Amp.	06 340 28
Fuse Panel - 12 x MCM 25	06 350 17
Fuse Panel - 6 x MCM 50	06 350 25
Fuse Panel - 3 x MCM 100	06 350 33
Fuse Panel - Hybrid	06 350 09
MCM Dimmer P.C.B.s	
Closed loop, Linear law trigger card.	08 127 33
Closed loop, Square law trigger card.	08 127 25
Open loop, Square law trigger card.	08 127 5T
Hard fired drive card.	08 127 68
Pulse fired drive card.	08 127 09
Non-dim drive card.	08 126 70
RFI Suppression card.	08 127 41

2.2 Mechanical Construction

The dimmers are built on a moulded plastic chassis, which has fixings for all the components. All connections to printed circuit boards are made via plugs mounted on the boards. The boards are held in place on the chassis by three plastic retainers which clip into the chassis. The thyristors are mounted on separate heatsinks, which are fastened directly onto the non-conducting chassis using self-tapping screws into slots provided in the heatsink extrusion. On MCM 25 and MCM 50 modules, there is good access to both sides of the thyristors without the removal of any other components. On MCM 100 modules, the two halves must be taken apart for full thyristor access.

The power connections to the modules are via pins mounted through holes in the rear of the chassis moulding. The control connections are through an RTG connector mounted on the rear of the module.The pins mate with sockets mounted on a plastic moulding clipped into the module crate.

The trigger card is positioned in such a way as to allow access to the top and bottom setting controls, where fitted, through holes in the front of the module.

2.3 Principle of Operation

An inverse-parallel connected pair of thyristors, SCR1 and SCR2, is supplied with firing pulses, the timing of which is derived from the trigger card. Each thyristor is switched on at the same relative instant during the appropriate half cycle of the Mains. The level of the control signal into the trigger card determines the firing instant, hence determining the RMS output voltage presented to the load.

2.4 Circuit Description /S Modules

Dwg.s 7C 19758, 7C 21701 and 7B 19760 refer.

The control signal to the dimmer is applied via terminal 7a and the Technical Earth, 8a. These lines are fed through to the trigger card on pins 3 and 2 respectively.

The trigger card produces a thyristor firing timing signal on pin 12. This is directed to one of the two gate drive cards on PL 2/2, where it is fed through a photodiode in an optocoupler. The signal is then directed to the second gate drive card in a similar fashion, and a return connection made to the trigger card on pin 16, in order to complete the current loop.

The gate drive cards drive their respective thyristors. The gates and cathodes are connected to PL1 pins 2 and 1 respectively.

The power supply transformer has three secondaries. One is 12.7V and feeds the trigger card; the other two supply 22.5V to the gate drive cards. The transformer is powered from the Mains input to the dimmer (phase) via the RFI card, which houses a protecting fuse, F1. The RFI card also holds capacitors for radio frequency interference suppression. One of the connections to these capacitors comes from after the filter in the dimmer circuit, which is mounted not in the module, but in the crate. This connects to the module on pin 1a. Neutral connections are made via pins 4a, 4b, 5a and 5b.

MCM 25 modules, being dual dimmers, have this circuitry duplicated.

2.5 Circuit Description /CS and /CL Modules

Dwg.s 7C 19759, 7C 21599 and 7B 19761 refer.

These modules are similar to the /S modules described above, but the RFI card is fitted with a transformer, which is used to provide a feedback signal to the trigger card.

2.6 Circuit Description /P Modules

These differ from /S modules described above, because they do not use gate drive cards. Instead, The firing timing signal from the trigger card drives a single blocking oscillator card for a pair of thyristors. The blocking oscillator card provides a train of gate pulses to the thyristors through a pulse transformer.

2.7 Circuit Description /ND Modules

These modules differ in function from those described above. The control signal on a typical /ND module is used to switch a load on or off by driving a heavy current relay within the module. Allowance is made to vary the level of the control signal at which the relay switches. The module is manufactured in two forms, a single channel MCM 50 /ND type, and a two channel MCM 25 /ND type. Both are fitted with a Ref 1267 Non-Dim Drive card, a power supply transformer, and one or two relay switches as required.

2.8 Setting Up Procedures

2.8.1 Equipment Required

A true R.M.S. voltmeter, such as a moving iron meter, a Dynamometer or a thermocouple based digital voltmeter. Care must be taken if other types of digital meters are used, as they may not be accurate in measuring the output waveform of a dimmer.

The dimmer should be loaded with 1kW of load.

2.8.2 Closed Loop Modules

Connect the R.M.S. voltmeter across the dimmer output. With the channel fader at full, adjust the top set control until the required maximum dimmer output is reached. Note: it is preferable that the maximum dimmer output is at least 5 volts below the Mains supply voltage.

MCM Closed loop modules are not fitted with a bottom set control, as this function is automatically set by the trigger card.

2.8.3 Open Loop Modules

Connect the R.M.S. voltmeter across the dimmer output. With the channel fader at zero, adjust the bottom set control until the dimmer output is just above Ø volts. Then adjust it back to Ø volts exactly. Set the channel fader to full, and adjust the top set control until the required maximum dimmer output is reached. Note: it is preferable that the maximum dimmer output is at least 5 volts below the Mains supply voltage. It is now advisable to check the bottom set again, and to perform any necessary adjustment as above. Then recheck the top set and continue this sequence of operations until a satisfactory result is achieved.

3. APPROVED THYRISTOR REPLACEMENT LIST

Manufacturer	MCM25	MCM50	MCM100
Rank Strand Code	161/B044	161/B045	161/B046
Mullard	BTW 40-600 RSA BTW 40-600 RSB BTW 40-600 RSC		
Westinghouse	U 9033-B5	U 1342-B5 U 9034-B5	
A.E.I.	RS 12/5 RS 24/5	RS 5/5 RS 13/5 RS 33/5 RS 41/5	RS 14/5
International Rectifier	G 1109 TH		
Brown Boveri	CS 23-06-G05		

4. APPROVED FUSE REPLACEMENT LIST

Module	Reyrolle Pullcap	Neozed	
		(Klockner Moeller)	(Siemens)
MCM 25	MD10A F318	-	5SE2-010
MCM 50	MD20A F320	DO2/25A	5SE2-025
MCM 100	GPE 20E 40A	DO2/50A	5SE2-050

4.1 Replacement Fuse Part Codes

When ordering replacement fuses from Rank Strand or one of its dealers, the following order codes should be quoted:

Module	Reyrolle Pullcap	Neozed
MCM 25	08 318 06	08 001 31
MCM 50	08 320 0T	08 001 4T
MCM 100	08 321 05	08 001 58

5. REF 1272 - Closed Loop Square Law Trigger Card

Product Code: 08 127 25

The closed loop square law trigger card occurs in two forms: Ref 1272 dual version for use in MCM 25 modules, and Ref 1272/D for use in MCM 50 and MCM 100 modules.

5.1 Function

The closed loop square law trigger card is used to convert a d.c. control voltage, typically 0 to -10 volts via a 10 kilohm resistor and a silicon diode (see Fig 5.1), into thyristor or triac firing timing signals. The circuit gives an approximate square law light to linear control voltage transfer ratio.

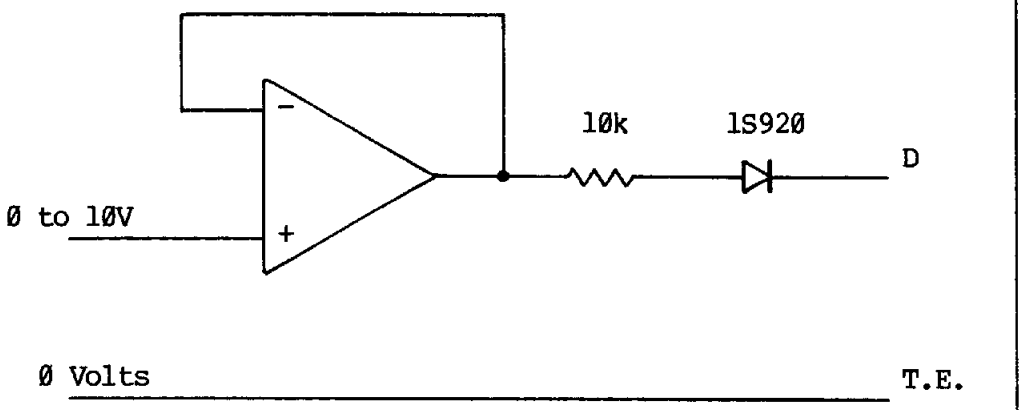


Fig. 5.1

5.2 Circuit Description

Dwg. 6B 19754 refers.

This circuit description is based on the Ref 1272/D version of the circuit. The Ref 1272 circuit differs merely by having part of the circuitry duplicated, to provide a second dimmer channel.

12.7V a.c. enters on pins 14 and 15, and is full wave rectified by diodes D7 - D10. The positive power rail is fed through a blocking diode D11, before being smoothed by capacitor C5. The ripple across C5 should be no more than 2V peak to peak. Resistor R10 is used to ensure that the anode of D11 collapses down to approximately the voltage on pin 16 at the Mains zero crossover point.

Normally, transistor VT1 is conducting, the base current being supplied through R12. When the Mains zero crossover point is reached, VT1 switches off, causing a base current to be supplied to VT5 through R14 and D21. This results in VT5 conducting and C10 is discharged via R23. D21 is used to prevent the base of VT5 being reverse biassed, and R23 is used to limit the collector current of VT5 during the discharge part of the cycle.

After C10 has been discharged, it is recharged slowly through R25 from the stabilised voltage rails generated by D20. The values of C10 and R25 are chosen such that the voltage across C10 will not exceed 4.5V by the end of the half cycle, before it is discharged. This generates a sawtooth waveform with a repetition rate equal to twice the supply frequency. D20, D19 and R11 together ensure that the ramp is stable by creating stable voltage rails.

The voltage rail defined between R11 and D20 is designated the Technical Earth of the dimmer, and is the reference point for the incoming control voltage signal on pin 2. Pin 3 is the control input and is noise suppressed by C8. Potentiometer RV2 and R31 form a potential divider acting on the control signal. RV2 is the top set control of the dimmer; adjustment of it changes the division ratio of the potential divider.

R23, C9 and Operational Amplifier IC2 form an integrator which is fed from the attenuated control signal. The output of the integrator is compared with the ramp voltage by the long-tailed pair VT7 and VT8. When the ramp becomes more positive than the integrator output, VT7 switches on, switching VT8 off and VT6 on. The collector signal is then fed to pin 12 as the firing timing signal via R15. The firing timing signal return is made through pins 13 and 16.

When no control signal is supplied to the card, the output of the integrator drifts positive to the potential of Technical Earth. As the positive end of C10 never reaches this voltage, VT7 will never switch on and the dimmer will remain off.

When a negative control signal is applied, the output of the integrator starts to go negative. A point is reached such that the ramp is more positive than the integrator output, and the power devices in the dimmer are switched on. A feedback signal from the output of the dimmer is fed in on pins 8 and 9, rectified by D12 - D14, and the signal processed by R19 - 22, 24, 26, 30, C6, 7, and D17. The modified signal presents a positive voltage to the input of the integrator, opposing the negative control signal. When the feedback signal reaches the level of the control signal, the output of the integrator stops moving; hence the long-tailed pair will switch at the same point in each half cycle. If the control signal is increased or decreased, the output of the integrator will change correspondingly, until the feedback signal again matches the input signal. The signal processing in the feedback loop determines the law of the dimmer.

On Ref 1272 cards, the same ramp generator is used for both channels, but the control input, integrator, comparator, output and feedback is duplicated for the second channel (the input appears on pin 4, output on pin 1, and feedback on pins 10 and 11).

6. REF 1273 - Closed Loop Linear Law Trigger Card

Product Code: 08 127 33

The closed loop linear law trigger card occurs in two forms: Ref 1273 dual version for use in MCM 25 modules, and Ref 1273/D for use in MCM 50 and MCM 100 modules.

6.1 Function

The closed loop linear law trigger card is used to convert a d.c. control voltage, typically 0 to -10 volts via a 10 kilohm resistor and a silicon diode (see fig. 5.1), into thyristor or triac firing timing signals. The circuit gives an approximate linear law voltage to linear control voltage transfer ratio.

6.2 Circuit Description

Dwg. 6B 19706 refers.

This circuit description is based on the Ref 1273/D circuit. The Ref 1273 circuit differs merely by having part of the circuitry duplicated, to provide a second dimmer channel.

12.7V a.c. enters on pins 14 and 15 and is full wave rectified by diodes D7 - D10. The positive power rail is fed through a blocking diode D11, before being smoothed by capacitor C5. The ripple across C5 should be no greater than 2V peak to peak. Resistor R10 is used to ensure that the anode of D11 collapses down to approximately the voltage on pin 16 at the Mains zero crossover point.

Normally transistor VT1 is conducting, the base current being supplied through R12. When the Mains zero crossover point is reached, VT1 switches off, causing a base current to be supplied to VT5 through R14 and D21. This results in VT5 conducting and C10 is discharged through R23. D21 is used to prevent the base of VT5 being reverse biassed, and R23 to limit the collector current of VT5 during the discharge part of the cycle.

After C1Ø has been discharged, it is recharged slowly through R25 from the stabilised voltage rails generated by D2Ø. The values of C1Ø and R25 are chosen such that the voltage across C1Ø will not exceed 4.5V by the end of the half cycle, before it is discharged.This generates a sawtooth waveform with a repetition frequency equal to twice the supply frequency. D2Ø, D19 and R11 together ensure that the ramp is stable by supplying stable voltage rails.

The voltage rail defined between R11 and D2Ø is designated the Technical Earth of the dimmer, and is the reference point for the incoming control voltage signal on pin 2. Pin 3 is the control input, and is noise suppressed by C8. Potentiometer RV2 and R31 form a potential divider acting on the control signal. RV2 is the top set of the dimmer; adjustment of it changes the division ratio of the potential divider.

R23, C9 and Operational Amplifier IC2 form an integrator which is fed from the attenuated control signal. The output of the integrator is compared with the ramp voltage by the long-tailed pair VT7 and VT8. When the ramp becomes more positive than the integrator output, VT7 switches on, switching VT8 off and VT6 on. The collector signal is then fed to pin 12 as the firing timing signal via R15. The firing timing signal return is made through pins 13 and 16.

When no control signal is supplied to the card, the output of the integrator drifts positive to the potential of Technical Earth. As the positive end of C1Ø never reaches this voltage, VT7 will never switch on and the dimmer will remain off.

When a negative control signal is applied, the output of the integrator starts to go negative. A point is reached where the ramp is more positive than the integrator output, and the power devices in the dimmer are switched on. A feedback signal from the output of the dimmer is fed in on pins 8 and 9, rectified by D12 - D14 and the signal processed by R19 - 22, 24, 26, 3Ø, C6, 7, and D18. The modified signal presents a positive voltage to the input of the integrator, opposing the negative control signal. When the feedback

signal reaches the level of the control signal, the output of the integrator stops moving; hence the long-tailed pair will switch at the same point in each half cycle. If the control signal is increased or decreased, the output of the integrator will change correspondingly, until the feedback signal matches the input signal. The signal processing in the feedback loop determines the law of the dimmer.

On Ref 1273 cards, the same ramp generator is used for both channels, but the control input, integrator, comparator, output and feedback is duplicated for the second channel (the input appears on pin 4, output on pin 1, and feedback on pins 10 and 11).

7. REF 1275 - Open Loop S-Law Trigger Card

Product Code: Ø8 127 5T

The open loop trigger card occurs in two forms: Ref 1275 dual version for use in MCM 25 modules, and Ref 1275/D for use in MCM 5Ø and MCM 1ØØ modules.

7.1 Function

The open loop trigger card is used to convert a d.c. control voltage, typically Ø to -1Ø volts via a 1Ø kilohm resistor and a silicon diode (see fig. 5.1) into a thyristor or triac firing timing signal. The circuit gives an approximately linear control voltage to timing signal transfer ratio.

7.2 Circuit Description

Dwg. 6C 19467 refers.

This circuit description is based on the Ref 1275/D circuit. The Ref 1275 circuit differs by having part of the circuitry duplicated to allow control of a second dimmer channel.

12.7V a.c. enters on pins 14 and 15, and is full wave rectified by diodes D4 - D7. The positive power rail is fed through blocking diode D8 before being smoothed by capacitor C4. The ripple across C4 should be no more than 2V peak to peak. R3 is used to ensure the anode of D8 collapses down to approximately the voltage on pin 16 at the Mains zero crossover point.

Normally transistor VT4 is conducting, the base current being supplied through R8. When the Mains zero crossover point is reached, VT4 switches off, causing a base current to be supplied to VT8 through R4 and D3. This results in VT8 conducting, and C1 is discharged through R14. D8 is used to prevent the base of VT8 being reverse biassed, and R14 to limit the collector current of VT8.

After C1 has been discharged, it is recharged slowly through R13 and potentiometer RV3. RV3 is the bottom set adjustment and controls the voltage across C1 at the end of the next half cycle, before the discharge is repeated. This generates a sawtooth waveform with a repetition frequency equal to twice the supply frequency. To ensure that the sawtooth ramp is stable, the charging voltage is stabilised by D1, D2 and R1.

The voltage rail defined between D1 and D2 is designated the Technical Earth of the dimmer, and is the reference voltage of the incoming control signal on pin 2. Pin 3 is the control input and is noise suppressed by C2. RV2 acts as a potential divider on the control signal, allowing the dimmer to be set up for a range of control voltages. This potentiometer acts as the topset for the dimmer.

The 'potted down' control signal is compared with the ramp generated across C1 by a long-tailed pair, VT6 and VT7, and R12 as the emitter current source. When the ramp level presented to the base of VT6 reaches the control signal level, VT6 switches on and VT7 switches off. The action of VT6 causes VT5 to switch on, giving an output on pin 12 designated G1. This output is then used to drive the gate firing circuits with return connections on pins 13 and 16. When C1 is discharged at the end of a half cycle, VT6 switches off and hence VT5 switches off. R9 and R11 are used to tie lines to their correct levels when driving transistors are switched off.

On Ref 1275, the same ramp generator is used, but the control input, comparator and output are duplicated for the second dimmer channel in a dual dimmer, the input on pin 1 and the output on pin 4.

8. REF 1274 - R.F.I. Suppression Card

Product Code: 08 127 41

8.1 Function

The R.F.I.card is used to suppress as far as possible any radio frequency interference caused by an MCM dimmer channel. On closed loop modules, the R.F.I. card is fitted with a transformer, which is used to provide a feedback signal to the trigger card in the module.

8.2 Circuit Description

Dwg. 6D 19973 refers.

Radio frequency interference is suppressed by two capacitors, C1 and C2, connected between Phase and Load, and Phase and Neutral respectively. A fuse, F1, rated at 250mA protects the Mains power supply transformer mounted in the module.

On closed loop modules, a transformer, T1, provides a feedback path to the trigger card from pins 1 and 2. The transformer is protected from the load by a fuse, F2, rated at 100mA. Items T1 and F2 are not fitted to the Ref 1274 card when used in open loop modules.

9. REF 1276 - Gate Drive Card

Product Code: Ø8 127 68

9.1 Function

The Gate Drive card acts as an isolating amplifier. It takes the thyristor/triac firing timing signals from the trigger card, isolates them through an opto-coupler, and amplifies them to a suitable level to drive thyristor or triac gates. NOTE: only thyristors with specified gate sensitivities can be used in MCM hard firing modules.

Because of the nature of the timing signal, the signal fed to the gate of the power device is a d.c. voltage, starting at the device switch-on time, and remaining to the end of the current Mains half cycle, thus providing hard firing of the power device.

This card works in both half cycles of the Mains; therefore it is suitable for both thyristor and triac firing.

9.2 Circuit Description

Dwg. 6C 19750 refers

22.5V a.c. enters on pins PL1/3,4 and is full wave rectified by diodes D2 - D5. Capacitor C1 smoothes the resulting waveform. The ripple should be 8V maximum. Resistor R6 and D1 act as a voltage regulator to limit the maximum voltage fed to the gate of the power device to 8.ØV.

In the opto-coupler, the current through the light emitting diode causes the photo transistor to conduct, allowing current to flow through R3 into the base of transistor VT1. VT1 then conducts, causing current to flow through R1 and the base of VT2. VT2 conducts, enabling a current flow to the gate of the power device via R4 and PL1/2. PL1/1 is connected to the thyristor cathode (main terminal 1 - triacs).

R5 is used to tie the gate of the power device down to the cathode (MT1). R2 and R7 are used to ensure leakage currents do not switch either VT1 or VT2 on. R4 and R6 are used as current limiting resistors.

10 REF 1270 - Blocking Oscillator Card

Product Code 08 127 09

10.1 Function

The Blocking Oscillator card acts as an isolator between the trigger card, and the thyristors or triac. It takes the thyristor/triac timing signals from the trigger card and produces a string of fast pulses to fire the thyristors/triac. Isolation is provided by us of a the transformer.

10.2 Circuit Description

Drg. 6C21039 refers

10.7 volts a.c. enters at PL1/3,4 and is full wave rectified and smoothed by diodes D3-D6 and C2 smoothes the resulting waveform. The ripple should be less than 3V P/P.

The thyristor timing signal is applied to the card on PL1/1, 2. When the input goes high, C1 charges through R4, 5 and winding 4 of the transformer, thus increasing the voltage on the base of VT1.

VT1 now conducts, causing current to flow through winding 2 of the transformer, which generates a potential across winding 4. This potential provides positive feedback into the base of VT1 causing VT1 to switch on harder. Also, C1 is changed negative. When the transformer saturates the potential disappears causing VT1 to switch off. C1 then charges back positive through R5 etc., until VT1 starts conducting and the cycle continues. When the input goes low, the cycle stops.

The outputs to the thyristors are via connectors PL2 and PL3, with pin 1 going to the gate, and pin 2 the cathode.

R6 is used to ensure the blocking oscillator is not spuriously switched on and D2, biassed by R3, prevents excessive reverse

biasing of the base-emitter junction of VT1. D1 suppresses reverse voltage transients from the transformer primary R1,2 are current limiting resistors.

11. REF 1267 - Non-Dim Drive Card

Product Code: 08 126 70

The MCM Non-Dim drive card occurs in two forms: Ref 1267 dual version for use in MCM 25 /ND modules, and the Ref 1267/D for use in MCM 50 /ND modules.

11.1 Function

The Non-Dim drive card is used to convert a variable d.c. control voltage, typically 0 to -10 volts via a 10 kilohm resistor and a silicon diode (see fig. 5.1) into a suitable signal for driving a heavy current relay. The circuit can be made to pull in the relay at different control signal levels, according to the selection of specific resistors on the card. A small amount of hysteresis is built in to prevent relay chatter with unstable control signals.

11.2 Circuit Description

Dwg. 6B 22972 refers.

This circuit description is based on the Ref 1267/D circuit. The Ref 1267 differs by having part of the circuitry duplicated to allow control of a second Non-Dim channel.

20V a.c. enters on pins 6 and 7 of PL1 and is full wave rectified by diodes D5 - D8. Capacitor C3 is used to smooth the power rails.

A reference voltage for the Schmitt trigger is set up by resistors R1 and R18 and Zener diode D12. Sub-reference rails are then generated by R2, R9,and D4. D4 is included to compensate for the diode in the control circuit, and therefore may be replaced by a wire link, should no diode be fitted in the control circuit. The positive end of D4 forms the Technical Earth reference point for the control signal. The negative end of D4 forms the reference point for the positive input of the operational amplifier IC1, providing the gain in the Schmitt trigger.

The Schmitt trigger comprises of IC1, D1, D2, R3 - 5, R8 and R1Ø. The input, D1 (pin 14) is negative with respect to TE (pins 15, 16). The operating voltage of the Schmitt trigger is dependent on the ratio of R3 to R8. The ratio should never be made greater than 56.

When the control is zero with respect to TE, the output of the Schmitt trigger (pin 6 on IC 1) is 'low', that is, hard negative. As the control, D1, becomes negative, the input of IC1 (pins 2 and 3) which is acting as a comparator, becomes biassed in such a way as to make the output swing 'high', that is, hard positive. Positive feedback is then generated by R4, R5 and D2, thus changing the reference voltage on pin 3 of IC1 by making it more positive. This provides the hysteresis in the Schmitt trigger. D1 is used to regulate the amount of positive feedback, by tying it to the reference voltage generated by D12.

As the control D1 approaches ØV, the inputs of IC1 become biassed to make the output go low. D2 stops conducting, thus taking the reference voltage on pin 3 of IC1 back to its' original level, providing hysteresis in the opposite direction.

The output on IC1 is fed to the base of VT1 via the potential divider R6 and R7. The resistors ensure that VT1 does not conduct when the output of IC 1 is low. When the output goes high, VT1 conducts, pulling pin 4, designated RLA1 down to the negative power rail. The coil of the Power Relay is connected between RLA1 and the positive voltage rail. D3 is used to suppress back E.M.F. from the coil.

Capacitor C2 is used to suppress unwanted noise on the control lines, preventing spurious operation.

On Ref 1267, the same reference voltage is used, but the Schmitt trigger and relay driver are duplicated to provide a second Non-Dim channel, the input being on pin 11, and the output to the relay on pin 13.

13. Drawings

1. Rack

1B 20486	MCM Rack
1A 22352	Assembly of MCM Rack 5 Crate
7A 21086	Rack wiring 2.5kW modules
7A 21087	Rack wiring 5kW modules
7A 22357	Rack wiring 10kW modules

2. Fan Tray

7C 21157	Fan Tray Wiring

3. Crates

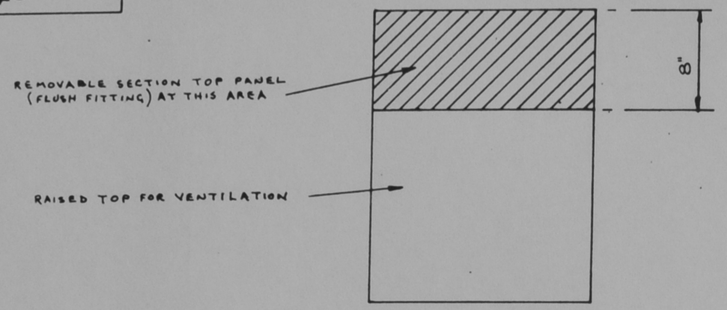
7B 21085	Crate Wiring 2.5kW modules
7B 21084	Crate Wiring 5kW modules
7C 21705	Crate Wiring 10kW modules
1B 21047	Rear Panel Assembly 2.5kW mmodules
1B 21088	Rear Panel Assembly 5kW modules
1B 21945	Rear Panel Assembly 10 kW modules

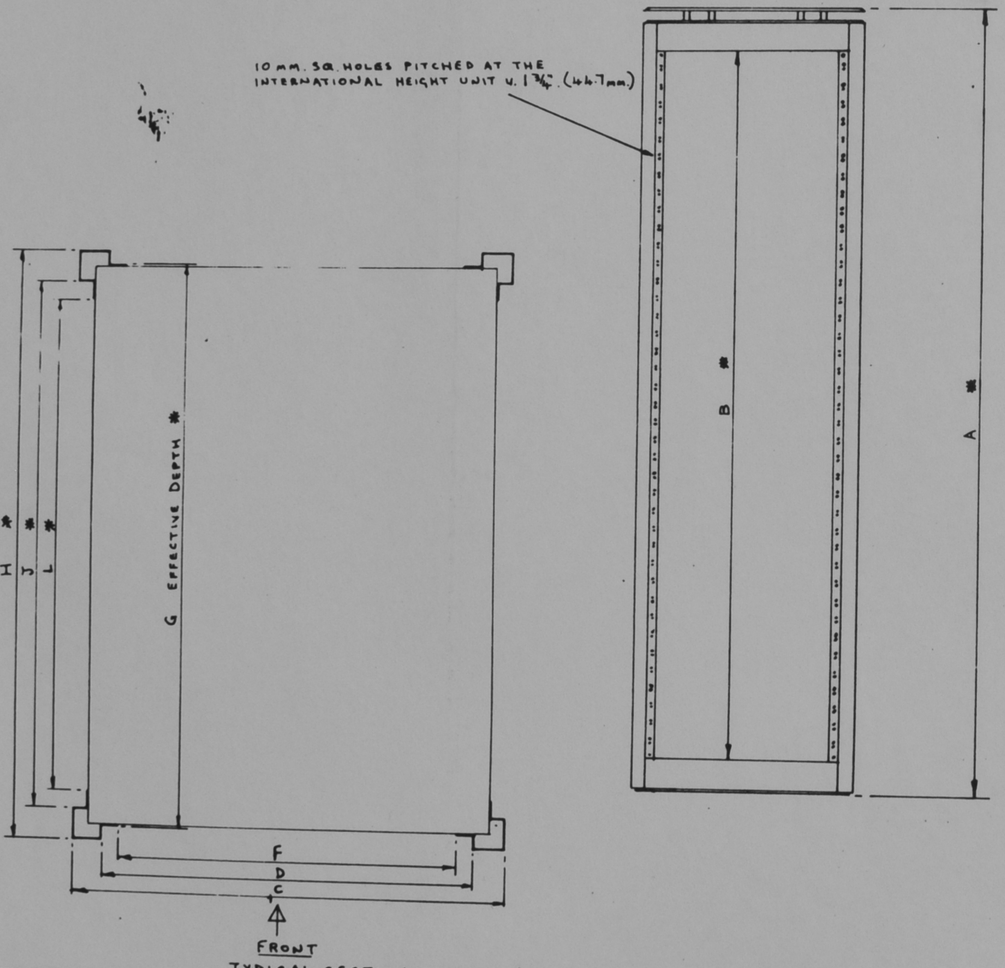
4. Modules

7B 19761	MCM 25 Closed loop module circuit
7C 19759	MCM 50 Closed loop module circuit
7C 21599	MCM 100 Closed loop module circuit
7B 19760	MCM 25 Open loop module circuit
7C 19758	MCM 50 Open loop module circuit
7C 21701	MCM 100 Open loop module circuit
7B 21594	MCM 25 Blocking oscillator module circuit
7C 21593	MCM 50 Blocking oscillator module circuit
6B 19754	Closed loop Square law circuit Ref 1272
6B 19706	Closed loop Linear law circuit Ref 1273
6C 19467	Open loop S-law circuit Ref 1275
6C 21039	Blocking Oscillator Ref 1270
6D 19773	R.F.I. Card circuit Ref 1274

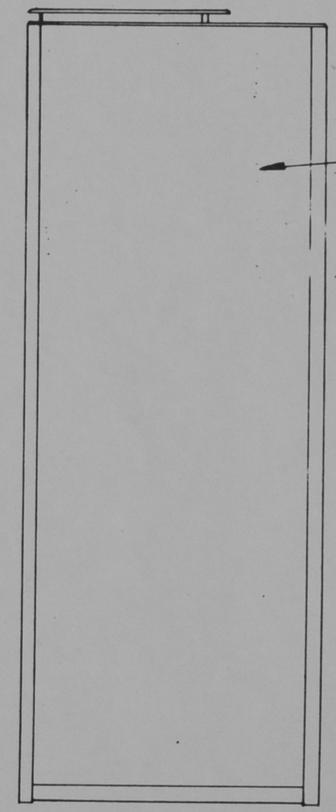
6C 19750	Gate Drive Card circuit Ref 1276
6B 22972	Non-Dim Drive card circuit Ref 1267
1A 20609	MCM 25 Module Assembly
1A 20610	MCM 50 Module Assembly
1A 21592	MCM 100 Module Assembly

DWG. NO 1B.20486 ISSUE. K.1/3





TYPICAL SECTION SCALE 1:4



DIMENSIONAL DATA

		INS.	MM.
* PANEL UNITS	39		
* O/ALL HEIGHT"	A	72	1830
* NOM. PANEL SPACE	B	68 1/4"	1733
PANEL WIDTH		19	483
O/ALL WIDTH	C	21 3/4	550
PANEL SPACE	D	19 3/8	492
CHASSIS OPENING	F	17 5/8	448
* EFFECTIVE DEPTH	G	28	711
* O/ALL DEPTH	H	32 3/8	820
* SIDE PANEL SPACE	J	26 1/2	673
* OPENING	L	24 3/4	628

DIMENSIONS MARKED * ARE DEVIATIONS FROM WIDNEY RACK R 300/10.

REV. 1. C.N. 2[illegible] Raised to Panel level at c/d 8-10-77 [illegible]

REV 2 CN°E2896 Panel cuts unit 40 Holes height unit 7/8 (19.84mm). Panel Space unit 70° 1778 mm ACF c/d 24-10-78

RACK SPEC: IE.21166

SUPPLIER: IMHOF

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Telephone 01-568 9222 Telex 27976
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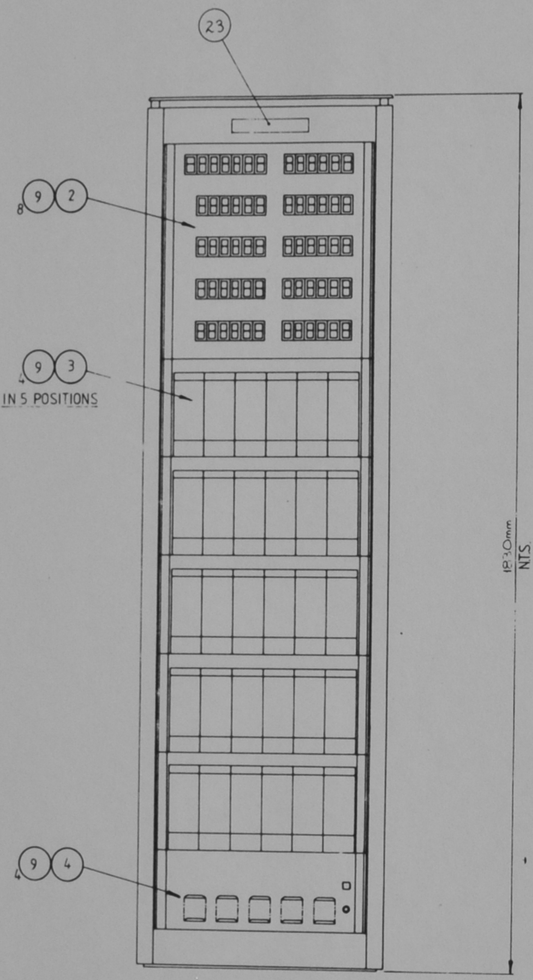
DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

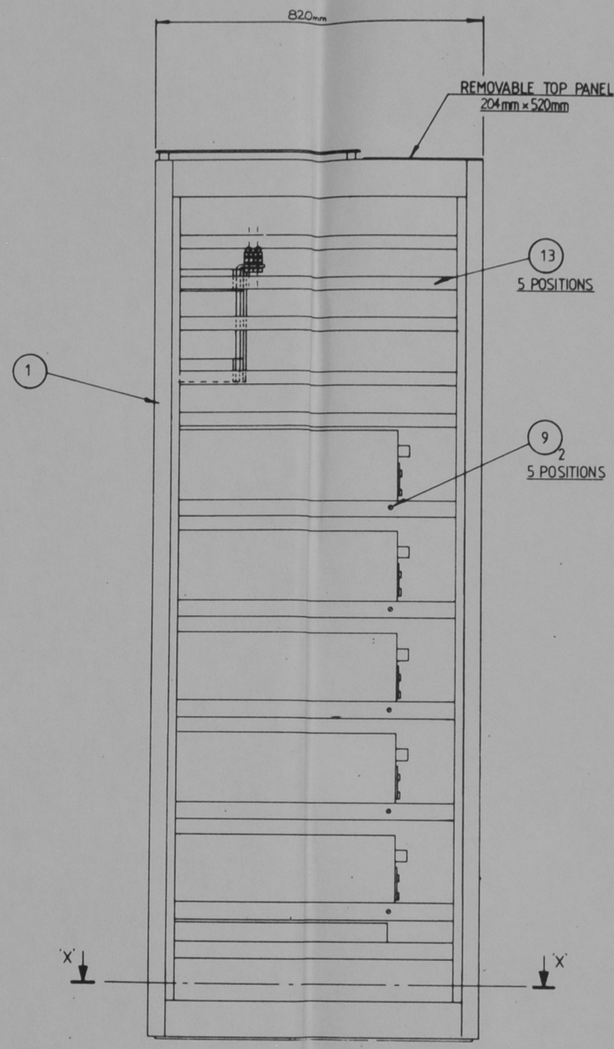
TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4 mm
DECIMAL ± ·008"	2 DEC PLACE ± 0·1 mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	
USED ON:- IE21166 MCM IL 13846	

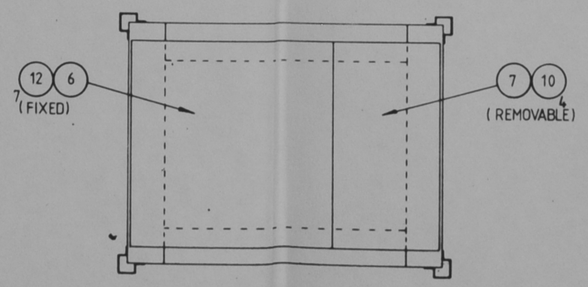
SCALE	1 : 8	DATE	TITLE:- M.C.M. RACK (SCRATES)
DRAWN	[illegible]	10-4-78	
CHECKED			
APPROVED			
MATERIAL:-			
FINISH:- Spec. 2P.21570			ISSUE. K.1/3 DWG. NO 1B.20486

DWG. No 1A 22352 | ISSUE 2 3 4 5 6 7 8

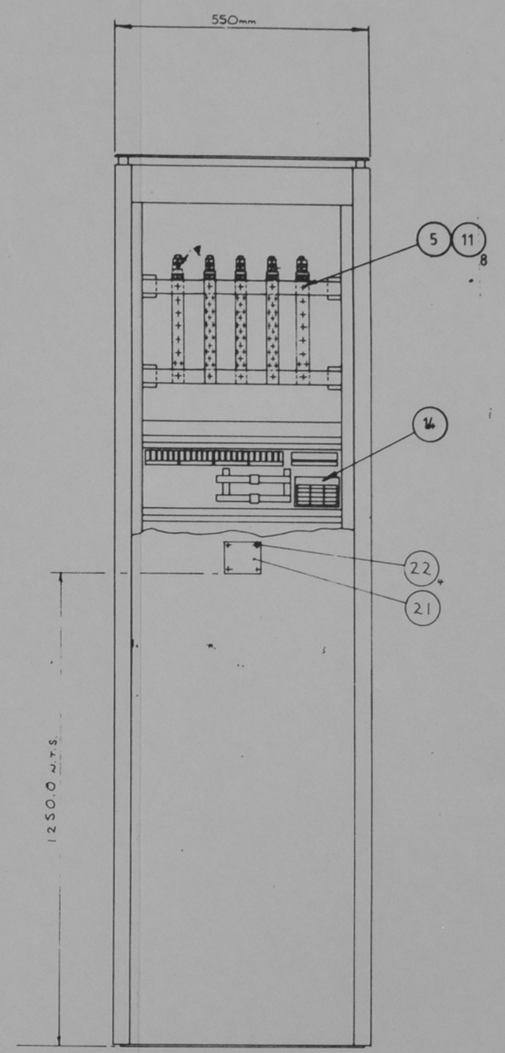


DIRECTION OF AIR FLOW





SECTION 'X-X'



NOTES

1, WIRING HARNESS. (8)

2, SIDE PANELS FITTED IF REQUIRED.

3, POSITION ITEM (21) CENTRAL IN WIDTH OF REAR DOOR (PRODUCT LABEL)

Rev 2 CN° E1850 Item 1 added Also 19" rack 1810 high 12" C/D 2010			
Rev 3 CN° E2264 Item 14 added 12" C/D 2040			
Rev 4 CN° 2806 Cable Assy. Item 1345 added 12" C/D 2040			
Rev 5 CN° E3078 Item 21 & 22 added 19" 5 & 90			
Rev 7 E 3501 Typ 25 added 32"			

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DIMENSIONS IN MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTIONS ± 1/64"	1 DEC PLACE ± 0·4mm
DECIMAL .XX ± 0·01"	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

USED ON MCM 1L 19846
1S22353

SCALE	1/3	
DRAWN	J.P.C.	5-10-83
CHECKED		7.12.83
APPROVED		
MATERIAL		
FINISH		

TITLE: ASSEMBLY OF MCM 2.5K RACK

ISSUE 2 3 4 5 6 7 8 | DWG. No 1A 22352

DWG No 7A21086 | ISSUE A B C 1

PHASE 1. BUS-BAR

PHASE 2. BUS-BAR

PHASE 3. BUS-BAR

TO SPECIFIED PHASES

FAN TRAY

PHASE TERMINALS 1 2 3 4 5 6

10A

NEUTRAL BUS-BAR

TO NEUTRAL BUS-BARS (CRATES)

EARTH BUSBAR

RACK

TO EARTH BUS-BARS (CRATES)

CRATE 1 (TOP)

PHASE TERMINALS 7 8 9 10 11 12

NEUTRAL

EARTH

CRATE 2

CRATE 3

CRATE 4

CRATE 5 (BOTTOM)

EARTH

WIRE SIZES

- 50 mm.² ITEM 1
- 1·5mm.² ITEM 9/10/11
- 2·5mm.² ITEM 7
- 6·0mm.² ITEM 6
- 16mm² ITEM 3

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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES
IMPERIAL | METRIC
FRACTION ± 1/64" | 1 DEC PLACE ± 0·4mm
DECIMAL ± .005" | 2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°
UNLESS OTHERWISE STATED

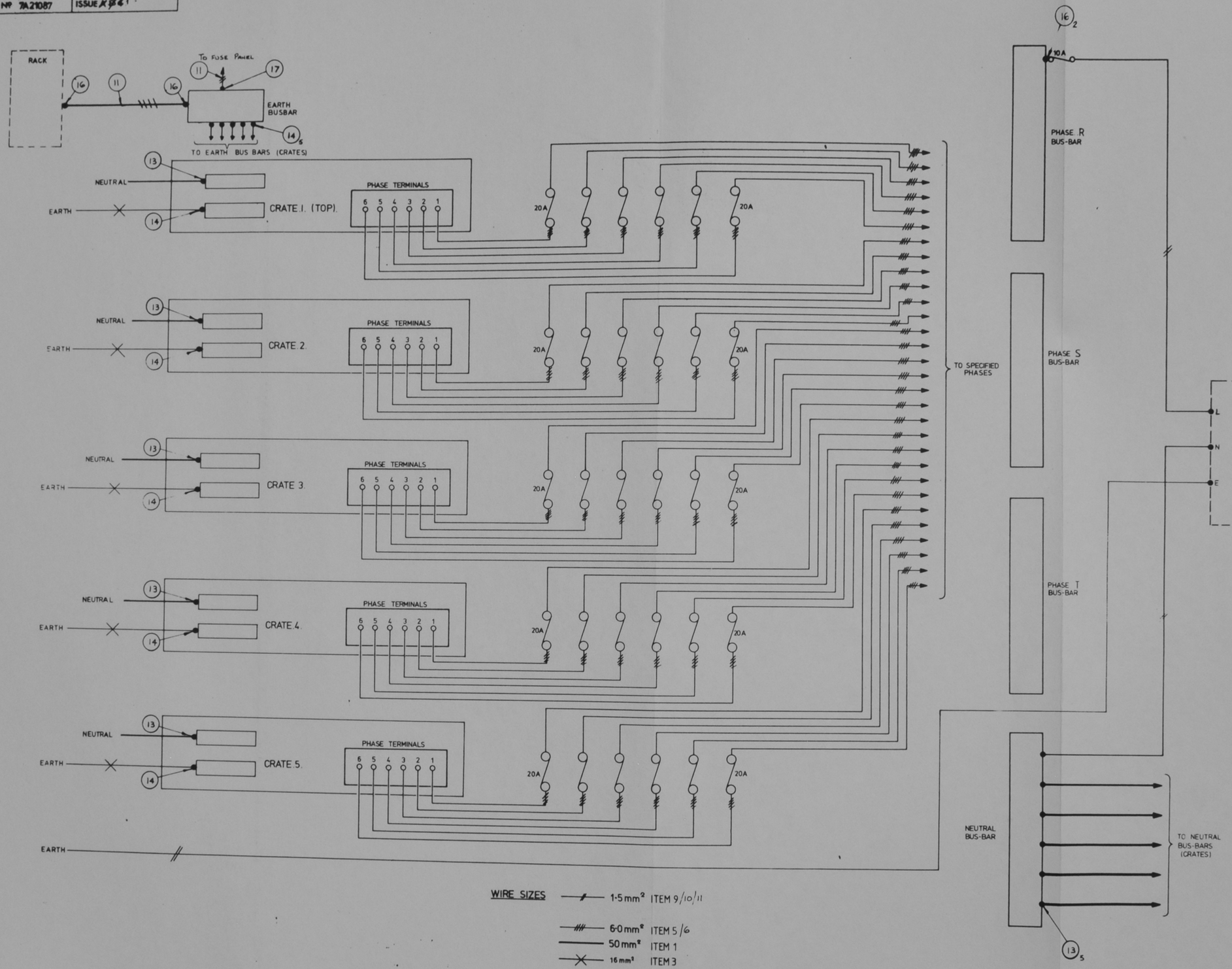
USED ON:- 1521703
MCM - IL/0846

SCALE
DRAWN D.S. 10-8-78
CHECKED
APPROVED
MATERIAL:- -
FINISH:- -
DATE

TITLE:- MCM DIMMERS - RACK WIRING. (2·5 KW MODULE)

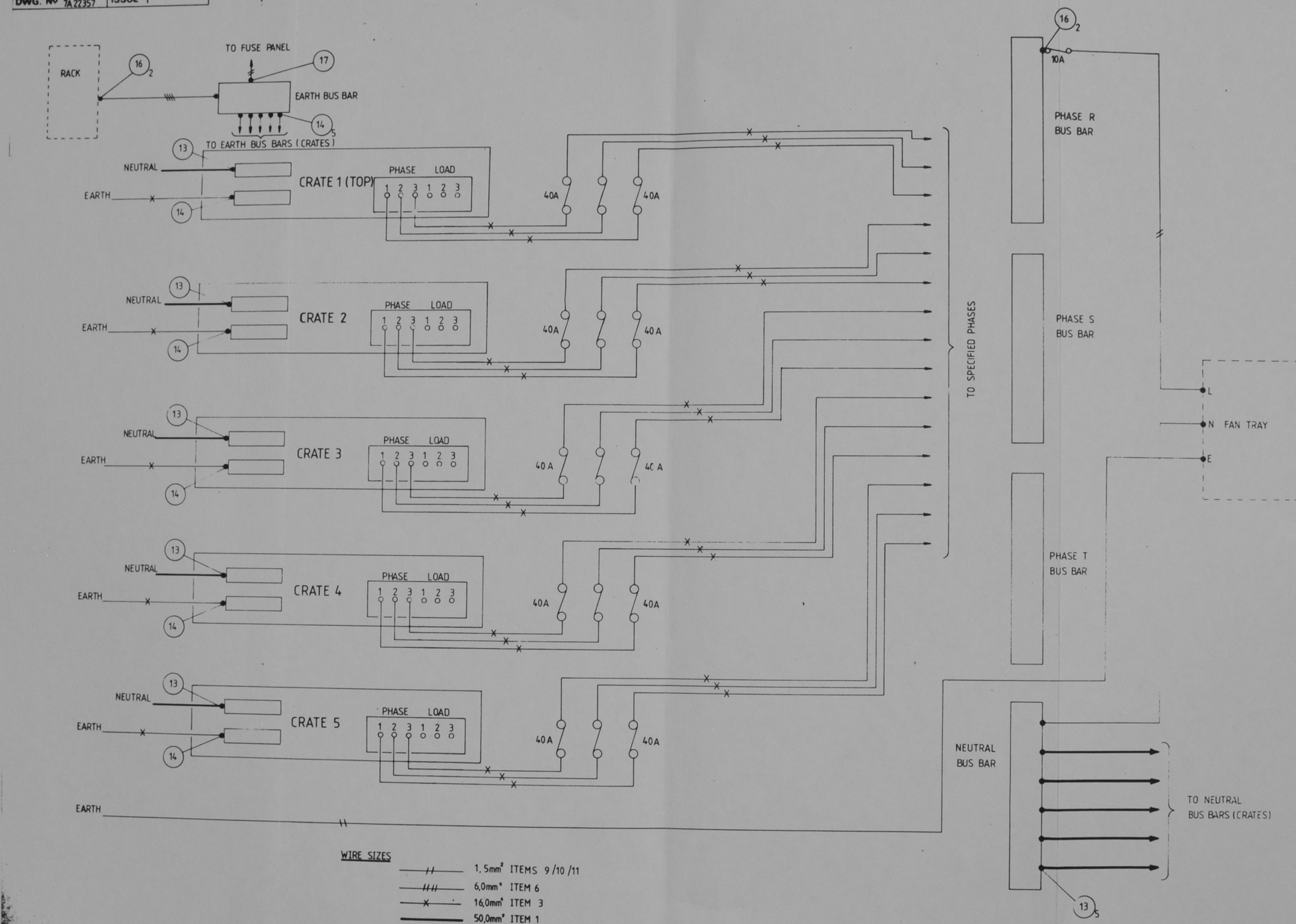
ISSUE A B C 1 | DWG. No 7A21086

DWG. Nº 7A21087 | ISSUE A/B/C/



RANK STRAND ELECTRIC A DIVISION OF RANK AUDIO VISUAL LIMITED	TOLERANCES IMPORTED / METRIC FRACTION ± 1/64" / 1 DEC PLACE ± 0·4mm DECIMAL ± ·005" / 2 DEC PLACE ± 0·1mm ANGULAR ± 0·25° UNLESS OTHERWISE STATED USED ON:- 7S21703 MCM - 1L1284G	SCALE DRAWN CHECKED APPROVED MATERIAL:- — FINISH:- —	DATE 9·2·78 20·2·78 20·2·78	TITLE:- MCM DIMMERS - RACK WIRING (5kW MODULE)
DIMENSIONS IN INCHES/MILLIMETRES THIRD ANGLE PROJECTION				ISSUE A/B/C/1 — DWG. Nº 7A21087

DWG. NO 7A22357 | ISSUE 1



WIRE SIZES

- 1,5mm² ITEMS 9/10/11
- 6,0mm² ITEM 6
- 16,0mm² ITEM 3
- 50,0mm² ITEM 1

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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES
IMPERIAL: FRACTION ± 1/64" DECIMAL .xx ± .005" | METRIC: 1 DEC PLACE ± 0·4 mm, 2 DEC PLACE ± 0·1 mm
ANGULAR ± 0·25°
UNLESS OTHERWISE STATED

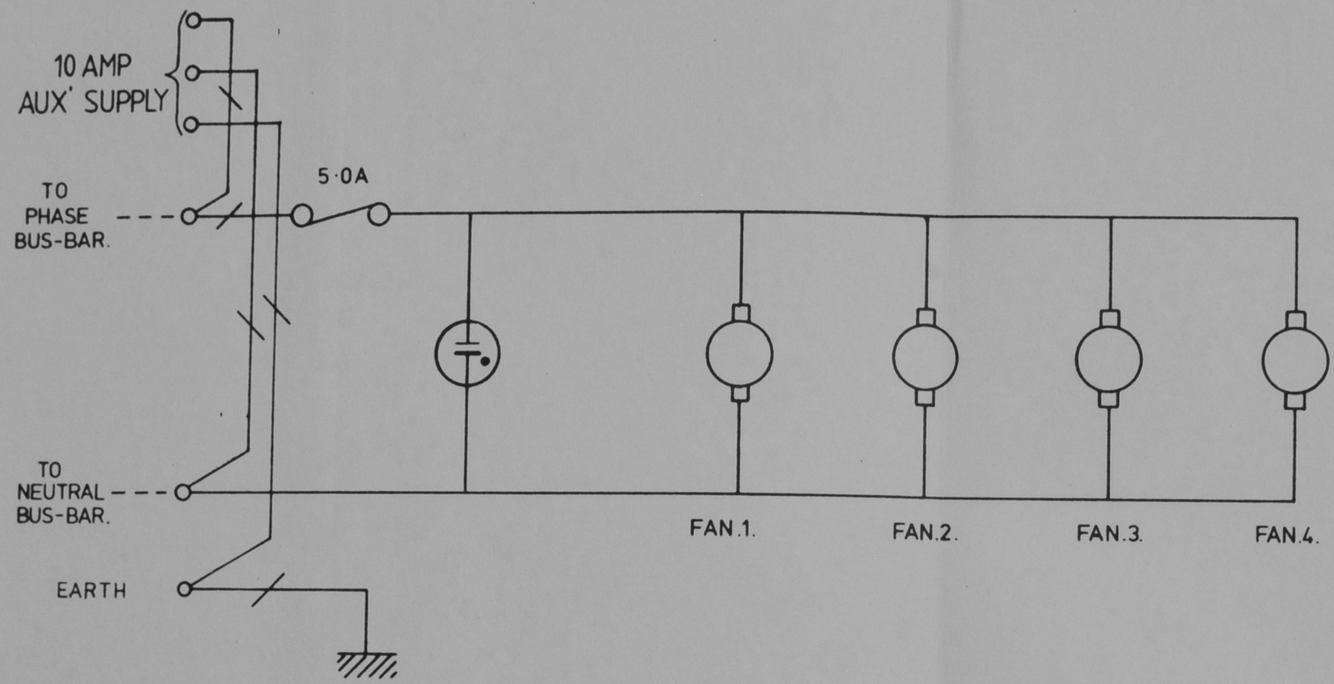
USED ON: 7S 21703 MCM 1L19846

SCALE
DRAWN RCLD DATE 9.10.79
CHECKED
APPROVED
MATERIAL:
FINISH:

TITLE:
MCM DIMMERS RACK WIRING
(10KW MODULES)

ISSUE 1 | DWG. N° 7A22357

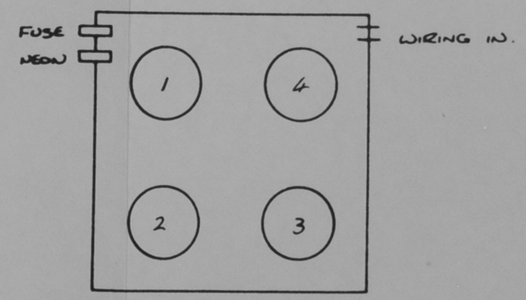
DWG. Nº 7C21157 | ISSUE ~~A~~ Ø1



WIRE SIZES

0,75mm² ——

1,5 mm² —/—



FAN TRAY

REV A. C.N°E 3267 Add Earth Wire 8-12-78 3/7/78

Rev 1 C N°22868 10 AMP Aux Supply Added. Wire Sizes Added. Earth To Chassis Issue 14-9-78 KC & DD

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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4mm
DECIMAL ± ·005"	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

USED ON :- 1521089

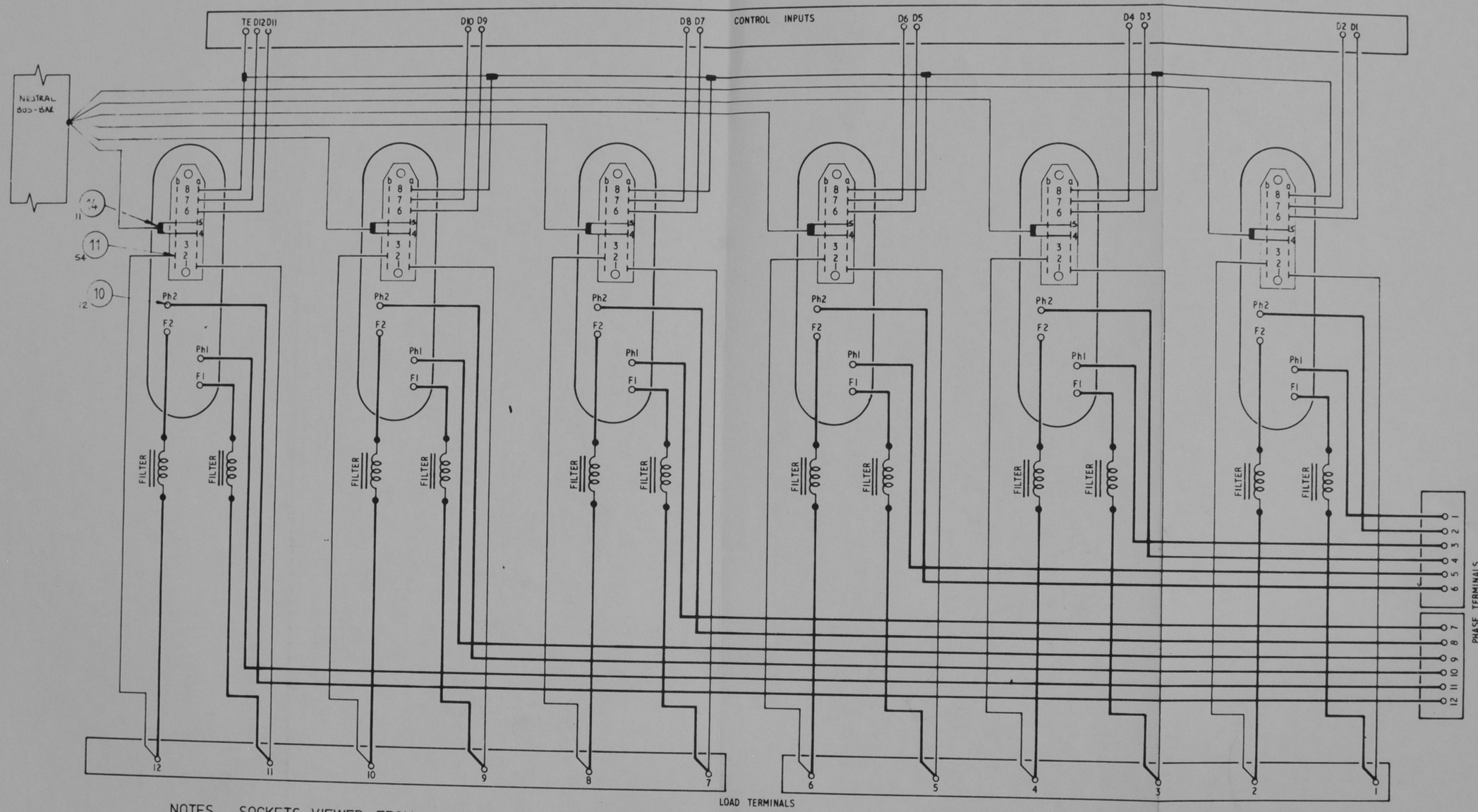
MCM IL19846

SCALE	*	DATE
DRAWN	J.E. Nalish	3·3·78
CHECKED	E.P. Lofthouse	8-3-78
APPROVED	A.B. Bunney	13-3-78
MATERIAL :-		
FINISH :-		

TITLE :- FAN TRAY WIRING.

ISSUE ~~A~~ Ø1 | DWG. Nº 7C21157

DWG. Nº 7B21085 | ISSUE A,B,C,D,E,F,1



NOTES SOCKETS VIEWED FROM WIRING SIDE.

WIRE SIZES

——— 0,75mm.² ITEM·8

——— 2,5mm.² ITEM·7

REV.	C.NO	
C	E3180	
Wiring altered.	L.E. West 13.3.78	
D	E3207	
Control Inputs re-numbered 24.3.78	I.A.	
E	CN°22868	
Connection to Neutral Bus Bar was via One Pair Ali. connectors Limited to Pal 45 Amps To Provide load 12 C 10 14.9.78		

SCHEDULE - IS21156

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RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	IMPERIAL	METRIC
FRACTION	± 1/64	1 DEC PLACE ± 0·4mm
DECIMAL	± ·005	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°		
UNLESS OTHERWISE STATED		

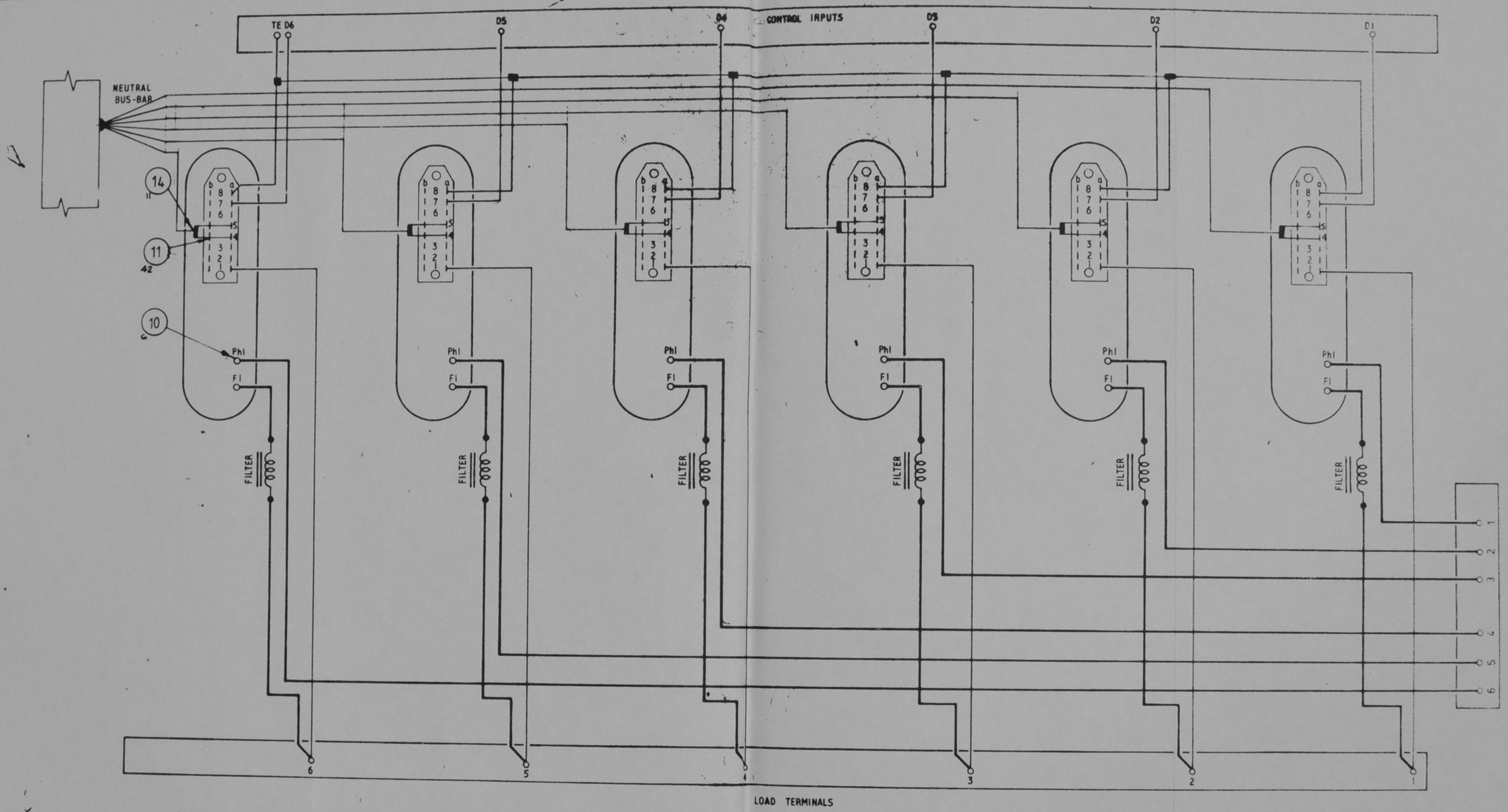
USED ON:- MCM - IL19846

		DATE
SCALE		
DRAWN	D.E. Nash	14.7.78
CHECKED	L.P. Lingwood	17-3-78
APPROVED		17-3-78
MATERIAL:-		
FINISH:-	—	

TITLE:- MCM MODULE SOCKETS/ CRATE WIRING (2,5kW)

ISSUE A,B,C,D,E,F,1 | DWG. Nº 7B21085

DWG. Nº 7B21084 | ISSUE A B C D 1



NOTES SOCKETS VIEWED FROM WIRING SIDE.

WIRE SIZES

——— 0,75mm.² ITEM 8

——— 6,0mm.² ITEM 6

REV 1 C.No
REV 2 E.5207
REV 3 E2826

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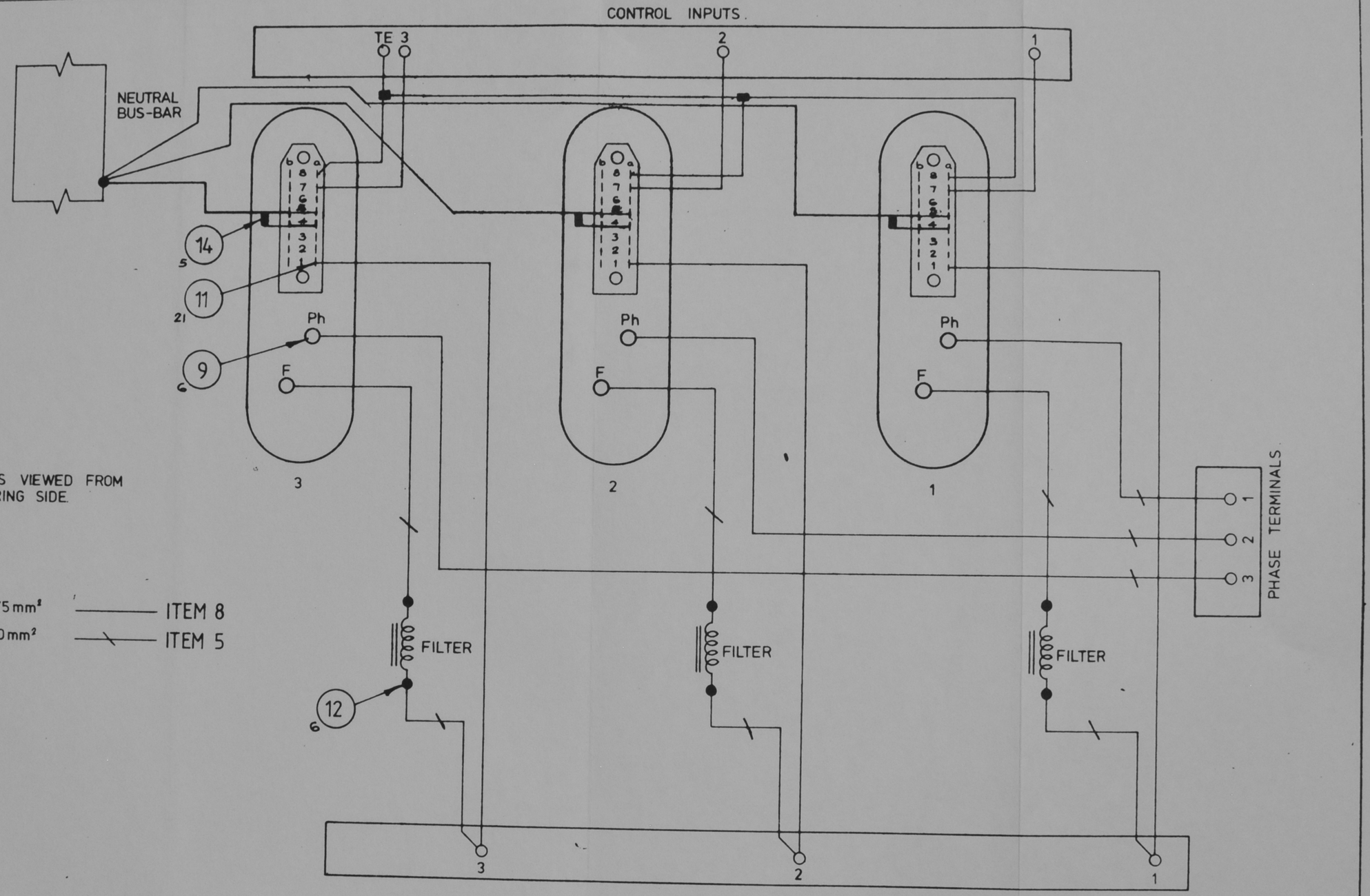
TOLERANCES		SCALE		DATE
IMPERIAL	METRIC	DRAWN	D.E. Naish	8.2.78
FRACTION ± 1/64	1 DEC PLACE ± 0.4mm	CHECKED	E.P. Lockwood	8-3-78
DECIMAL ± 005	2 DEC PLACE ± 0.1mm	APPROVED		8-3-78
ANGULAR ± 0.25°		MATERIAL	—	
UNLESS OTHERWISE STATED				
DIMENSIONS IN INCHES/MILLIMETRES		USED ON	MCM 1L15040	
FIRST ANGLE PROJECTION		FINISH	—	

SCHEDULE - 1521560

TITLE - MCM MODULE SOCKETS / CRATE WIRING (5kW)

ISSUE A B C D 1 | DWG. Nº 7B21084

DWG. Nº 7C21705 | ISSUE A 1



0·75mm² ——— ITEM 8

16·0mm² —/— ITEM 5

REV.1 C.N°22846
Bus Bar Supply was from Out Post & Connected UM Bus 4.18. Level 2. Production Issue 14.9.78 KR CAD

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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4mm
DECIMAL ± 005"	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

USED ON :- MCM IL15846

SCALE	—	DATE
DRAWN	D.E. Nash.	30.4.78
CHECKED	E.P. LOCKWOOD	3/5/78
APPROVED	[illegible]	7-7-78

MATERIAL :- —

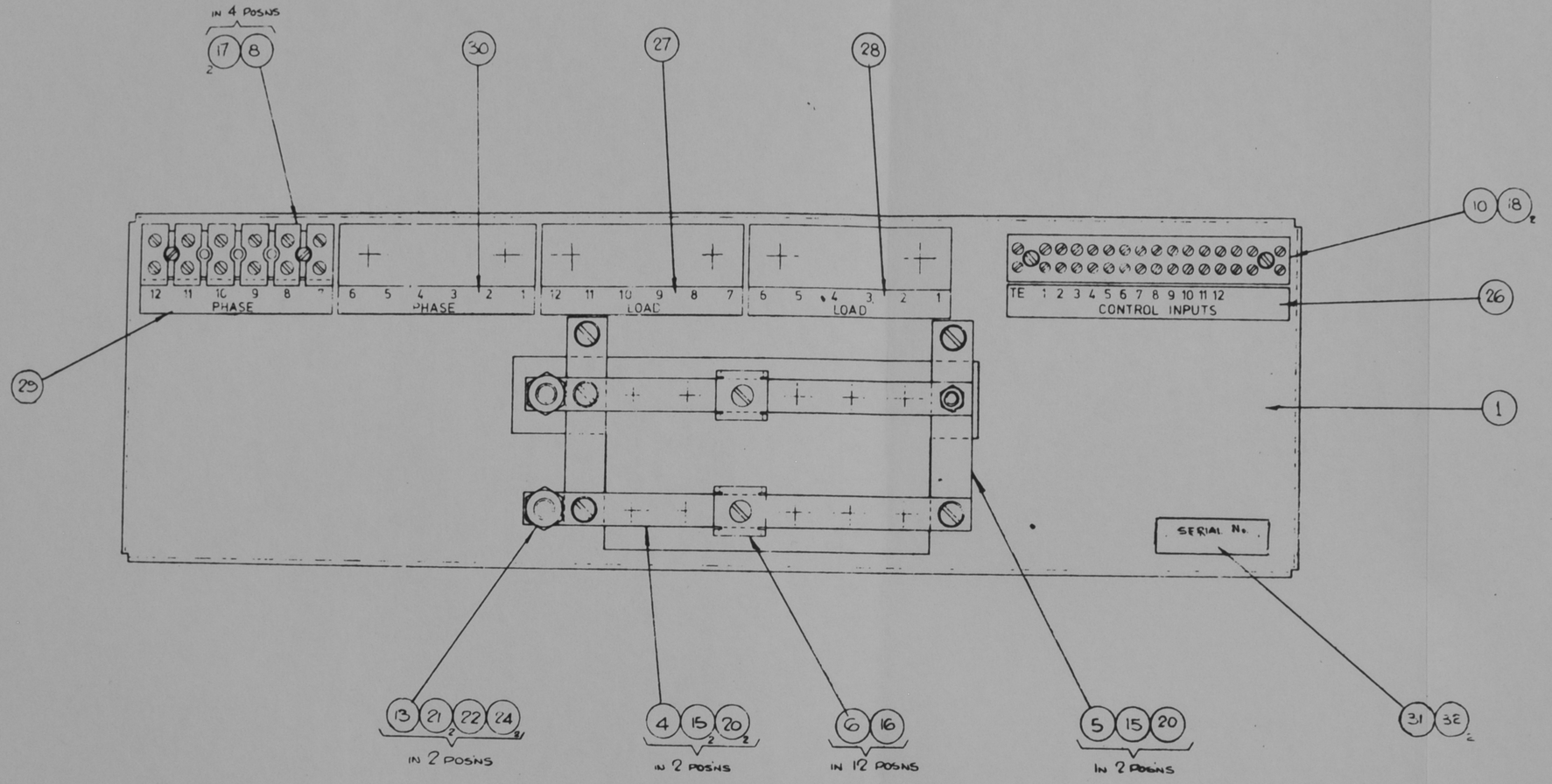
FINISH :- —

SCHEDULE 1S 21156

TITLE :- MCM. 10KW. CRATE WIRING

ISSUE A. 1 | DWG. Nº 7C21705

WG. Nº 1B21047 | ISSUE ~~A.B.C.~~ 2



REV.	C.No
B	6390

REV 1 CN 6390 A
FIXING ON ITEM 4
INVERTED REPEAT
REMARK REMOVED
FROM ITEM 1
LAST RAISED TO
PRODUCTION ISSUE
KR CN 6390 A 5.4.78
REV 2 CN 6390 B 5.7.78
TERMS 31 & 32
ADDED
HC 21.7.78

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A DIVISION OF
RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64	1 DEC PLACE ± 0.4mm
DECIMAL ± .005	2 DEC PLACE ± 0.1mm
ANGULAR ± 0.26°	
UNLESS OTHERWISE STATED	

USED ON:- MCM - IL1B946

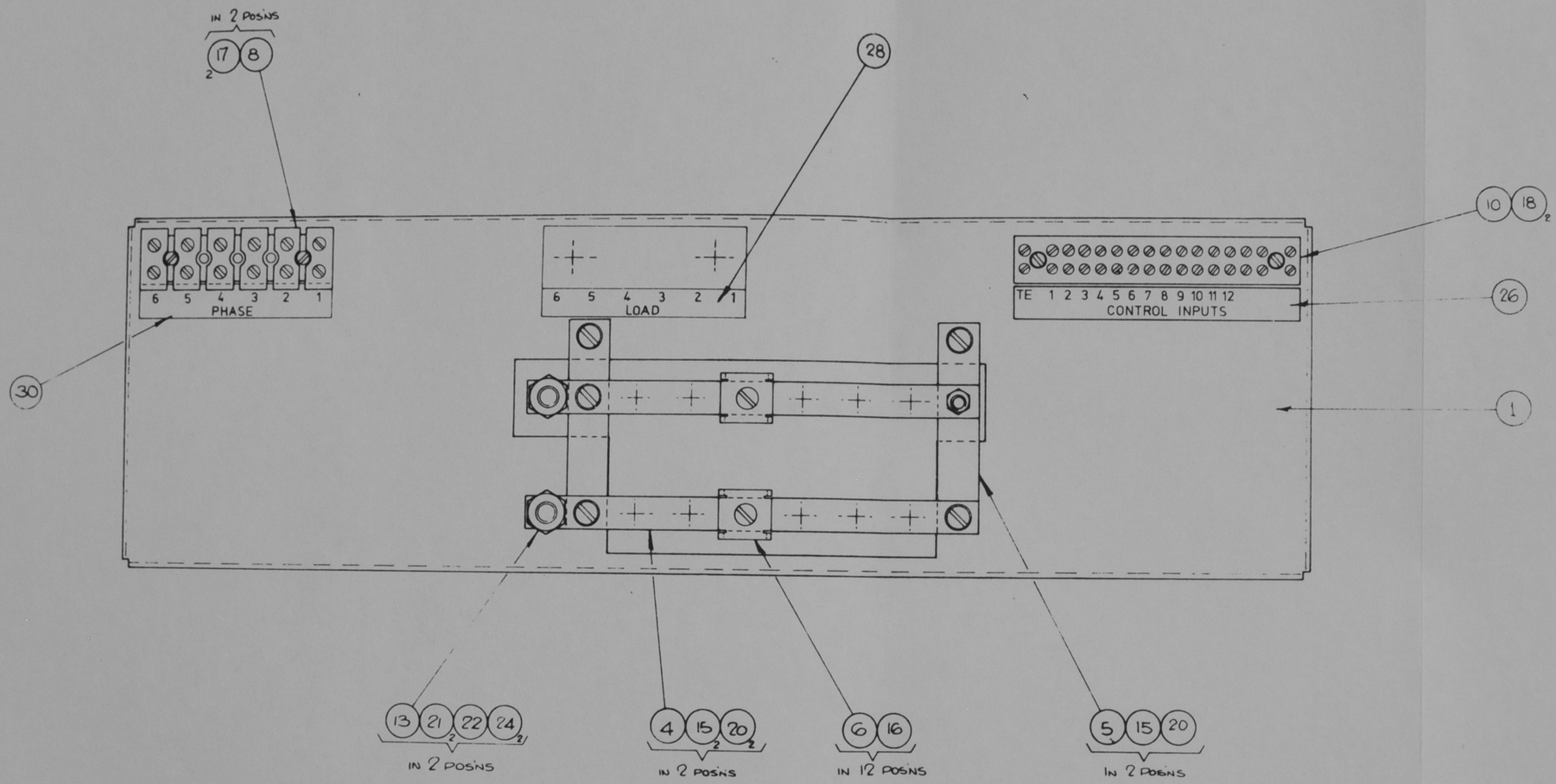
SCALE	Full Size	DATE
DRAWN	D.E. NAISH	31.1.78
CHECKED	P.P. Hagerman	9-3-78
APPROVED	[illegible]	[illegible]
MATERIAL:-		
FINISH:-		

SEE SCHEDULE - 1B21048

TITLE:-
REAR PANEL ASSEMBLY
(2.5 KW MODULE)

ISSUE ~~A.B.C.~~ 2 | DWG. Nº 1B21047

DWG. Nº IB21088 | ISSUE ~~A~~ C. 1.



REV.	C.NO.	
	5910	
	6.6.1978	
	31.3.78	

REV. C.NO.
REV. 1 C.4782&6
POSN OF ITEM 28 CHANGED. NUT FOR FIXING ITEM 4 WAS OTHER SIDE REF ONLY NOTE REMOVED FROM ITEM 1. DRG RAISED TO PRODUCTION ISSUE KR C/O 31.3.78

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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES		
IMPERIAL	METRIC	
FRACTION ± 1/64	1 DEC PLACE	± 0.4mm
DECIMAL ± 005	2 DEC PLACE	± 0.1mm
ANGULAR ± 0.25°		
UNLESS OTHERWISE STATED		

USED ON -
MCM - IL19846

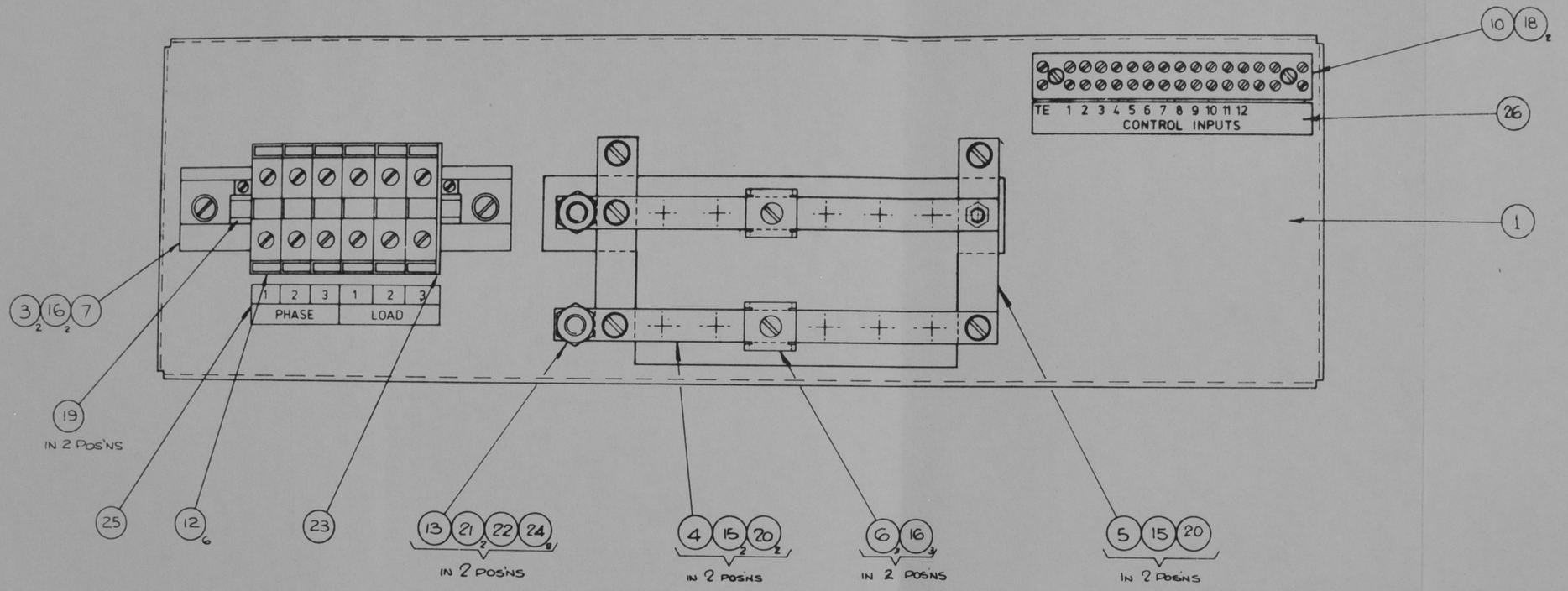
SCALE	FULL SIZE	DATE
DRAWN	D.E. NAISH	31.1.78
CHECKED	E.R. GOODMAN	8-3-78
APPROVED	[signature]	13-3-78
MATERIAL -	—	
FINISH -	—	

SEE SCHEDULE - IB21048

TITLE -
REAR PANEL ASSEMBLY
(5 KW MODULE)

ISSUE ~~A~~ C 1. | DWG. Nº IB21088

DWG. Nº 1B21945 | ISSUE A 1



REV.	C.NO	
1	E2868	REF ONLY REMARK REMOVE FROM ITEM NUT FOR FIANIS ITEM 4 WAS OMEL SHE RAISE ISSUE

SEE SCHEDULE - 1S21048

RANK STRAND ELECTRIC
PO BOX 70 Great West Road Brentford Middlesex TW8 9HR
Telephone 01-568 9222 Telex 27976
A DIVISION OF
RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64	1 DEC PLACE ± 0.4mm
DECIMAL ± .005	2 DEC PLACE ± 0.1mm
ANGULAR ± 0.25°	
UNLESS OTHERWISE STATED	

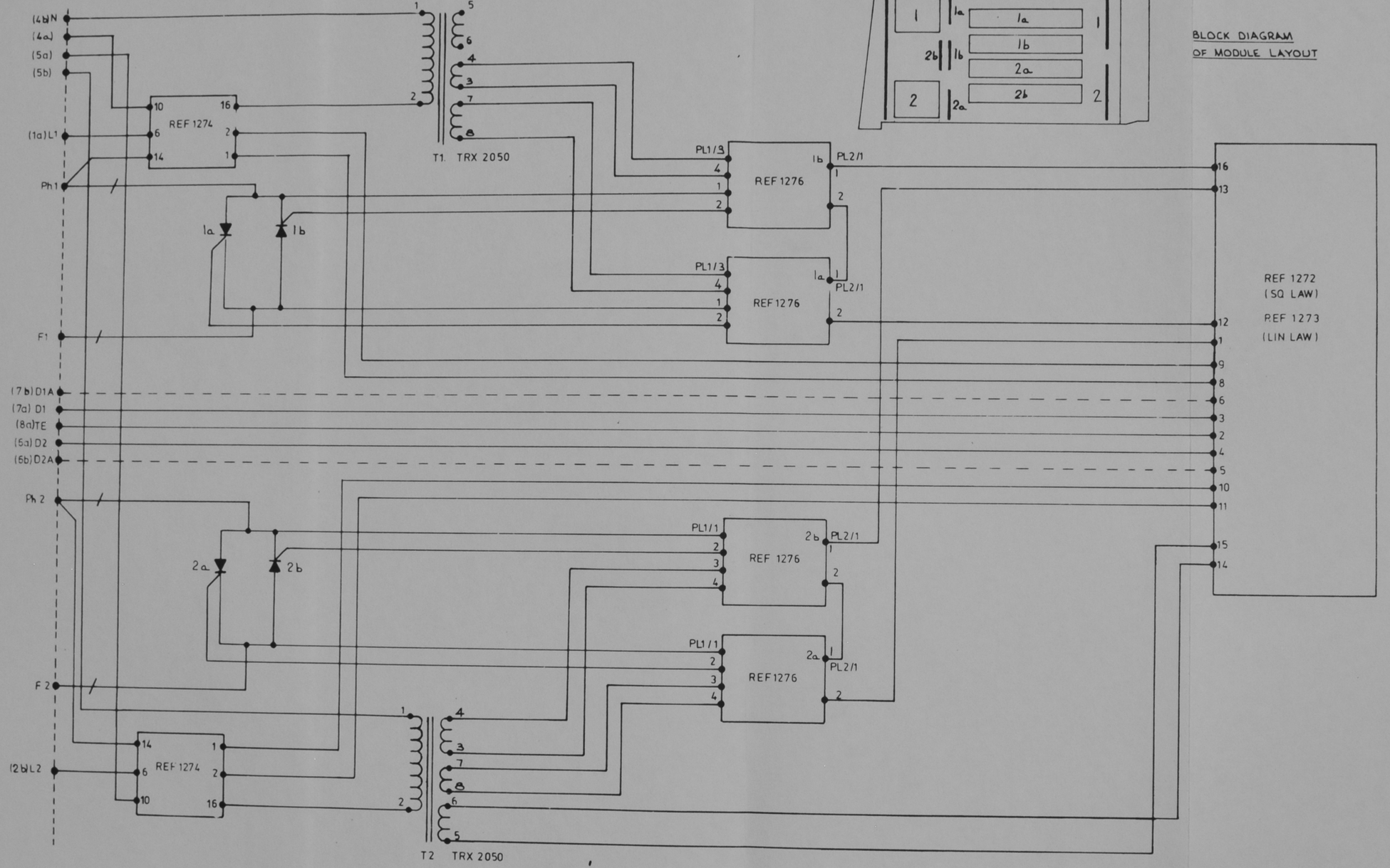
USED ON:-
MCM - IL19846

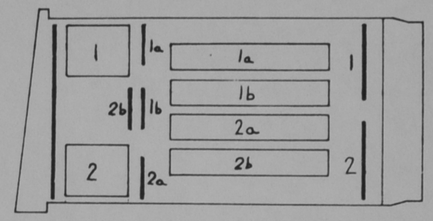
SCALE	FULL SIZE	DATE
DRAWN	D.E. NAISH	31.1.78
CHECKED	[illegible]	3/2/78
APPROVED	[illegible]	3.2.78
MATERIAL -	—	
FINISH -	—	

TITLE -
REAR PANEL ASSEMBLY
(10KW MODULE)

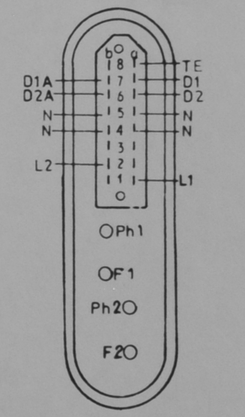
ISSUE A 1 | DWG. Nº 1B 21945

DWG. Nº 7819761 | ISSUE A B C 1.





BLOCK DIAGRAM OF MODULE LAYOUT



MODULE CONNECTOR VIEWED FROM PIN SIDE

0·5mm²

2·5mm²

NOTE

WIRES SHOWN ---- CAN BE USED FOR POSITIVE VOLTAGE CONTROL

REV.	C.S.Nº	
1	E898	Connections to REF1278/14&15 Removed 11.5.78 RK
KEY 2	CN2868	F2 & Ph2 INVERTED 1a & 2a WERE X1 1b & 2b WERE X2 T2-D was 3, 7 was 4 3 was 8, 4 was 7 REF 1276 3 & 4 INVERTED SYMBOLS 1a, 1b, 2a & 2b ADDED. REF 1272 conn 14 & 15 WERE TO T1 NOTE FOR POS VOLTAGE CONNECTION ADDED BLOCK DIAGRAM ADDED 24.5.78 TO PRODUCTION ISSUE
KB	6.9.78	4a & 4b INVERTED T1. 4 was 7, 3 was 8. 7 was 4, 8 was 3

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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4mm
DECIMAL ± .005"	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

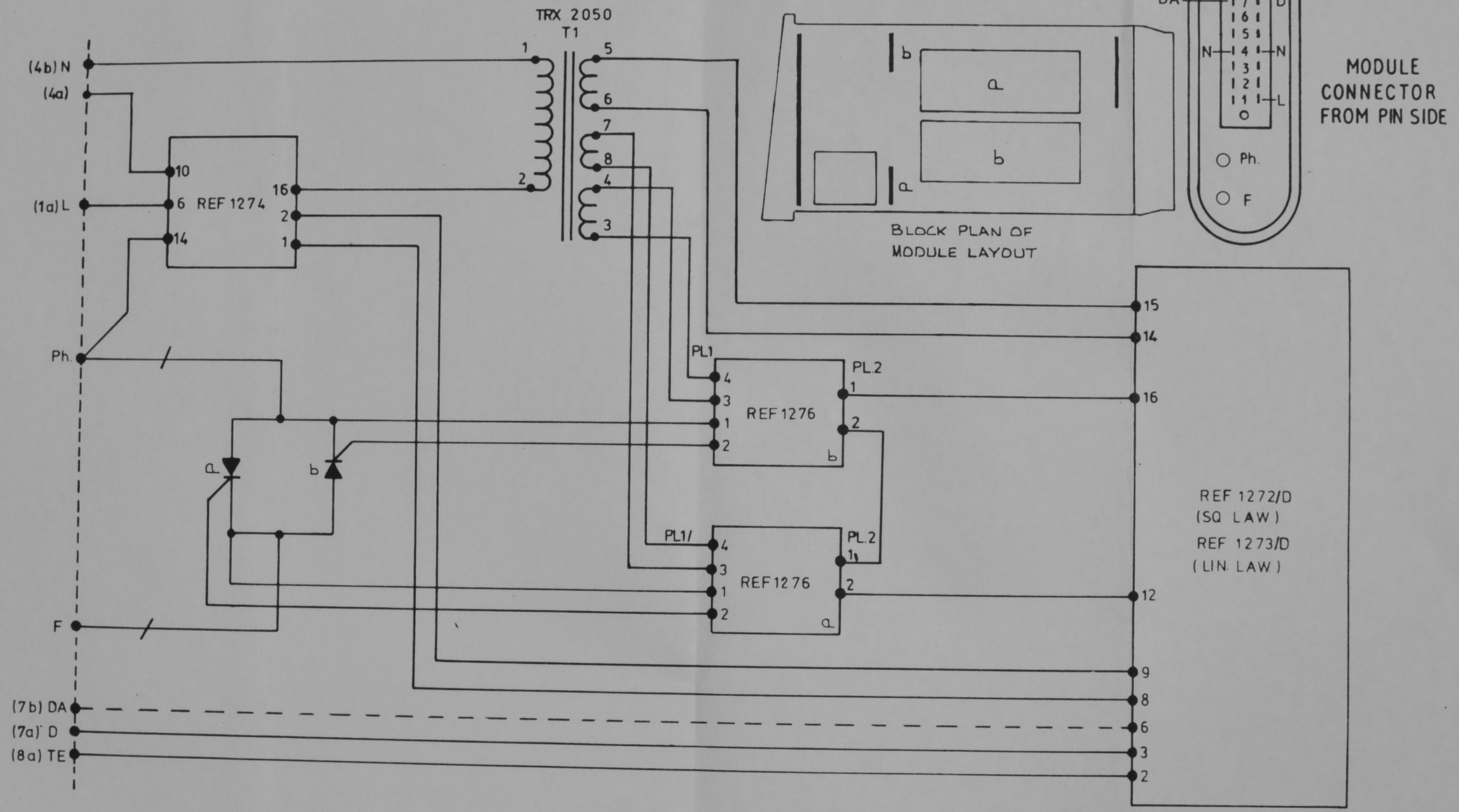
USED ON:- 1520611 IL19753

		DATE
SCALE		
DRAWN	C.HAYWARD	24.8.77.
CHECKED		
APPROVED		17-3-78
MATERIAL:-		
FINISH:-		

TITLE:-
MCM MODULE
- CLOSED LOOP 2 x 2·5Kw. THYRISTOR MODULE CIRCUIT DIAGRAM.

ISSUE A B C 1. | DWG. Nº 7819761

DWG. N° 7C19759 | ISSUE A B C D 1



REV.1 C.N°E3026 No. 4 CONNECTIONS REVERSED 24 4 78 F.K.

REV.2 C.N°E3231 PCB REF 1276 CONNECTIONS ALTERED F.K. 4/7/78

REV.3 C.N°E2868 DIODES a & b WERE X1 & X2. POSITIVE VOLTAGE NOTE ADDED BLOCK PLAN ADDED RAISED TO PRODUCTION ISSUE K.R. C & D 6.5.78

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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4 mm
DECIMAL ± ·005"	2 DEC PLACE ± 0·1 mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	
USED ON :- IS20611	
IL19753	

		DATE
SCALE		
DRAWN	G.HAYWARD	24.9.77
CHECKED	E.P.LOCKWOOD	17/3/78
APPROVED		17-3-78
MATERIAL :-		
FINISH :-		

TITLE :-

M.C.M. MODULE
CLOSED LOOP 5Kw. THYRISTOR.
MODULE CIRCUIT DIAGRAM.

ISSUE A B C D 1 | DWG. N° 7C19759

DWG. Nº 7C 21599 | ISSUE A 1

TRX 2050
T1

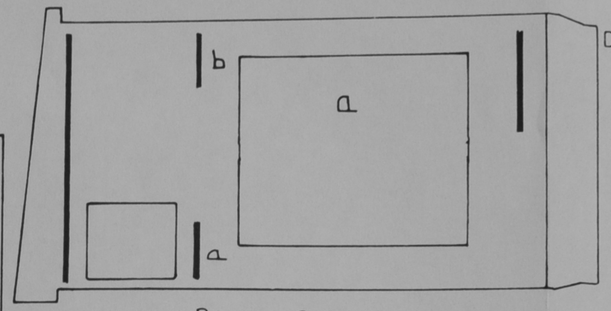
(4b) N
(4a)
(1a) L
Ph
F
(7b) DA
(7a) D
(8a) TE

REF 1274

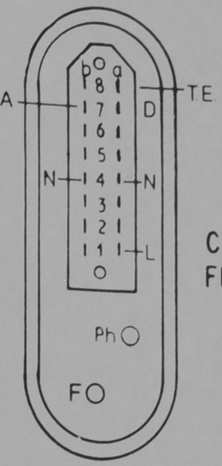
REF 1276

REF 1276

REF 1272/D
(SQ LAW)
REF 1273/D
(LIN LAW)



BLOCK PLAN OF
MODULE LAYOUT



MODULE
CONNECTOR
FROM PIN SIDE

0·5 mm²
10.0 mm²

WIRES SHOWN ----- CAN BE USED
FOR POSITIVE VOLTAGE CONTROL

REV 1 C Nº E3205
RELEASED FOR PRODUCTION
24.9.76 PTL

REV 2 CNºE2868
NOTE FOR POS'VE VOLTAGE CONTROL
ADDED BLOCK PLAN
ADDED T1 CONNS
3 WAS 7 4 WAS 8
7 WAS 3 8 WAS 4
REF 1276 CONNS
1 & 2 INVERTED &
REF a & b ADDED
RAISED TO PRODUCTION ISSUE
KR 6-9-77

RANK STRAND ELECTRIC
A DIVISION OF
RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64	1 DEC PLACE ± 0.4 mm
DECIMAL ± 005	2 DEC PLACE ± 0.1 mm
ANGULAR ± 0.25°	
UNLESS OTHERWISE STATED	

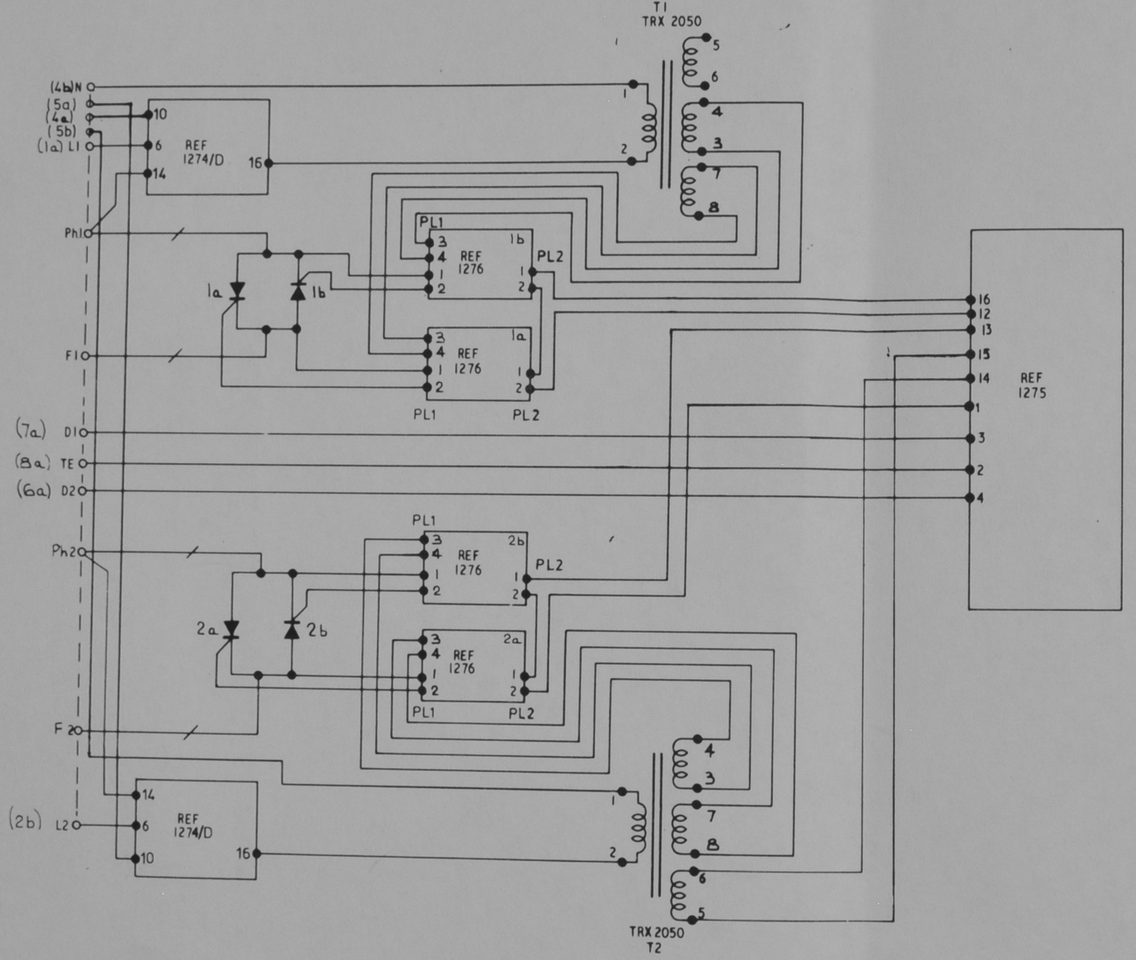
USED ON - 1520611
IL19753

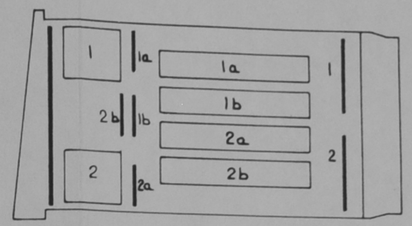
SCALE		
DRAWN	D LASIMAN	13 4 78
CHECKED	E P LOCKWOOD	21/4/78
APPROVED		21-4-78
MATERIAL		
FINISH		

M.C.M. 100
CLOSED LOOP MODULE
CIRCUIT DIAGRAM.

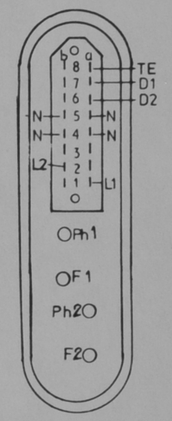
ISSUE A 1 | DWG. Nº 7C 21599

DWG. Nº 7B19760 | ISSUE #B C1





BLOCK DIAGRAM OF MODULE LAYOUT



MODULE CONNECTOR VIEWED FROM PIN SIDE

WIRING

0·5mm²

2·5mm²

REV	C.No
1	E328 Connection T2/6a To REF 1275 Reversed. PAC.
2	C.No 2868 Notes 1a, 2a, 1b, 2b 6a, 7a & 8a Added F2 & Ph2 inserted. Diodes were X1 4X2 Ref 1276 - 3 was 4. 4 was 3. 1 was 2. 2 was 1. Ref 1275 Connections 14 & 15 were to T1, 5 & 6 T2 - 4 was 3. 8 & 7 3 was 4. 7 was 8. Block diag added Raised to prod'n Issue KR C 4D 6-9-78 T1 - 4 was 7 3 was 8 7 was 4. 8 was 3.

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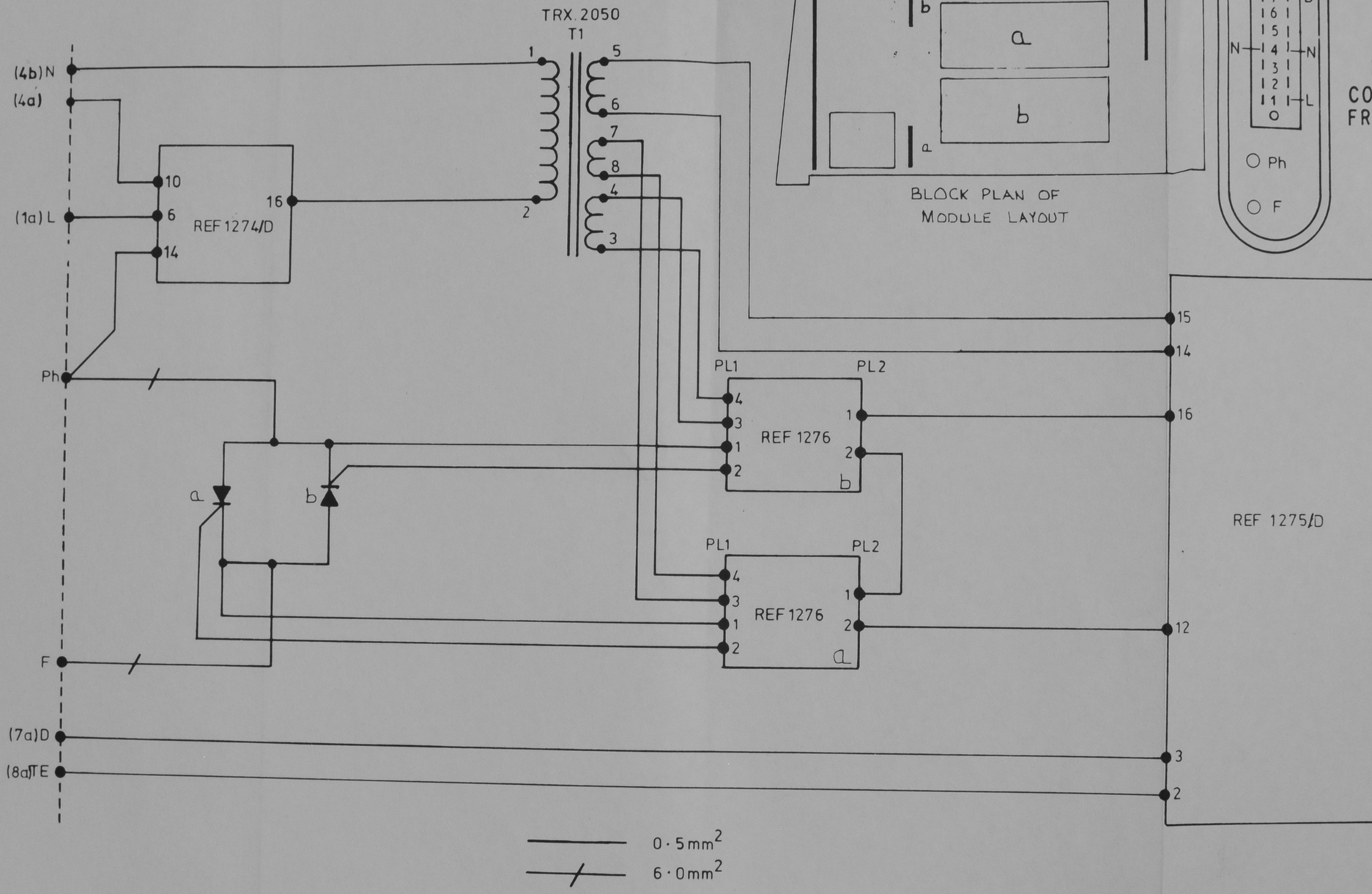
DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

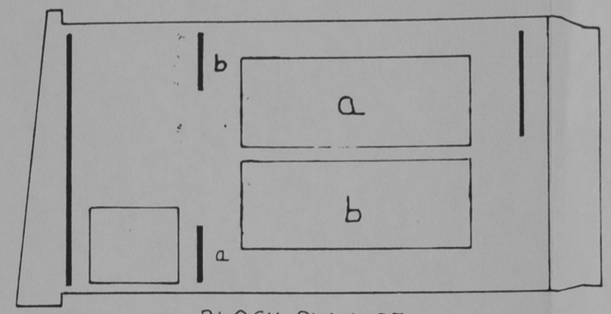
TOLERANCES		SCALE		DATE
IMPERIAL	METRIC	DRAWN	A.E. Nash	24.9.77
FRACTION ± 1/64	1 DEC PLACE ± 0·4mm	CHECKED	R. FLOCKHART	17-7-78
DECIMAL ± 005	2 DEC PLACE ± 0·1mm	APPROVED		17-7-78
ANGULAR ± 0.25° ' "		MATERIAL:-		
UNLESS OTHERWISE STATED				
USED ON:- 1520fd IL19753		FINISH:-		

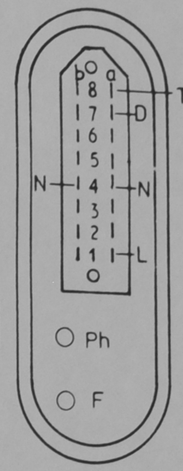
TITLE:-
MCM MODULE
OPEN LOOP 2 x 2·5 KW. THYRISTOR MODULE - CIRCUIT DIAGRAM.

ISSUE #B C1 | DWG. Nº 7B19760

DWG. Nº 7C19758 | ISSUE ~~A~~ ~~B~~ ~~C~~ ~~D~~ 1,







REV 1 C.Nº E3208
No. 4 CONNECTIONS
REVERSED
24.4.78 PMK.

REV 2 C.Nº E3231
PCB REF 1276
CONNECTIONS
ALTERED

REV 3 CNº E2868
DIODES a & b WERE
X1 & X2 REF a & b
ADDED TO REF 1276
BLOCK PLAN ADDED
RAISED TO PRODUCTION
ISSUE
KR C&D 6-9-78

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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4mm
DECIMAL ± 005"	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

USED ON :- 1520611
1L19753

		DATE
SCALE	—	
DRAWN	G.HAYWARD	24·9·77
CHECKED	E.P.LOCKWOOD	17-3-78
APPROVED	K.Robinson	17-3-78
MATERIAL :-		
FINISH :-		

TITLE :-
M.C.M. MODULE.
OPEN LOOP 5Kw. THYRISTOR
MODULE – CIRCUIT DIAGRAM.

ISSUE ~~A~~ ~~B~~ ~~C~~ ~~D~~ 1, | DWG. Nº 7C19758

DWG. Nº 7C 21701 | ISSUE A1

TRX. 2050
T1

(4b) N
(4a)
(1a) L
Ph
F
(7a) D
(8a) TE

REF 1274/D

REF 1276

REF 1275/D

BLOCK PLAN OF
MODULE LAYOUT

MODULE
CONNECTOR
FROM PIN SIDE

0·5mm²
10.0mm²

REV.1 C.N.E8208
RELEASED FOR
PRODUCTION MK
24.4.78

REV.2 CN.E8268
DIODE a + b WERE
X1 & X2. TI-CONN'S
7 WAS 3 - 8 WAS 4
3 WAS 7 - 4 WAS 8
REF 1276 :- 4 WAS 1
3 WAS 2, 1 WAS 4
2 WAS 3, 1 WAS 6
2 WAS 6 REF a + b
ADDED
RAISED TO PRODUCTION
ISSUE A
KR C + D 5-5-78
Block Plan Added

RANK STRAND ELECTRIC
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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64	1 DEC PLACE ± 0.4mm
DECIMAL ± 005	2 DEC PLACE ± 0.1mm
ANGULAR ± 0.25°	
UNLESS OTHERWISE STATED	

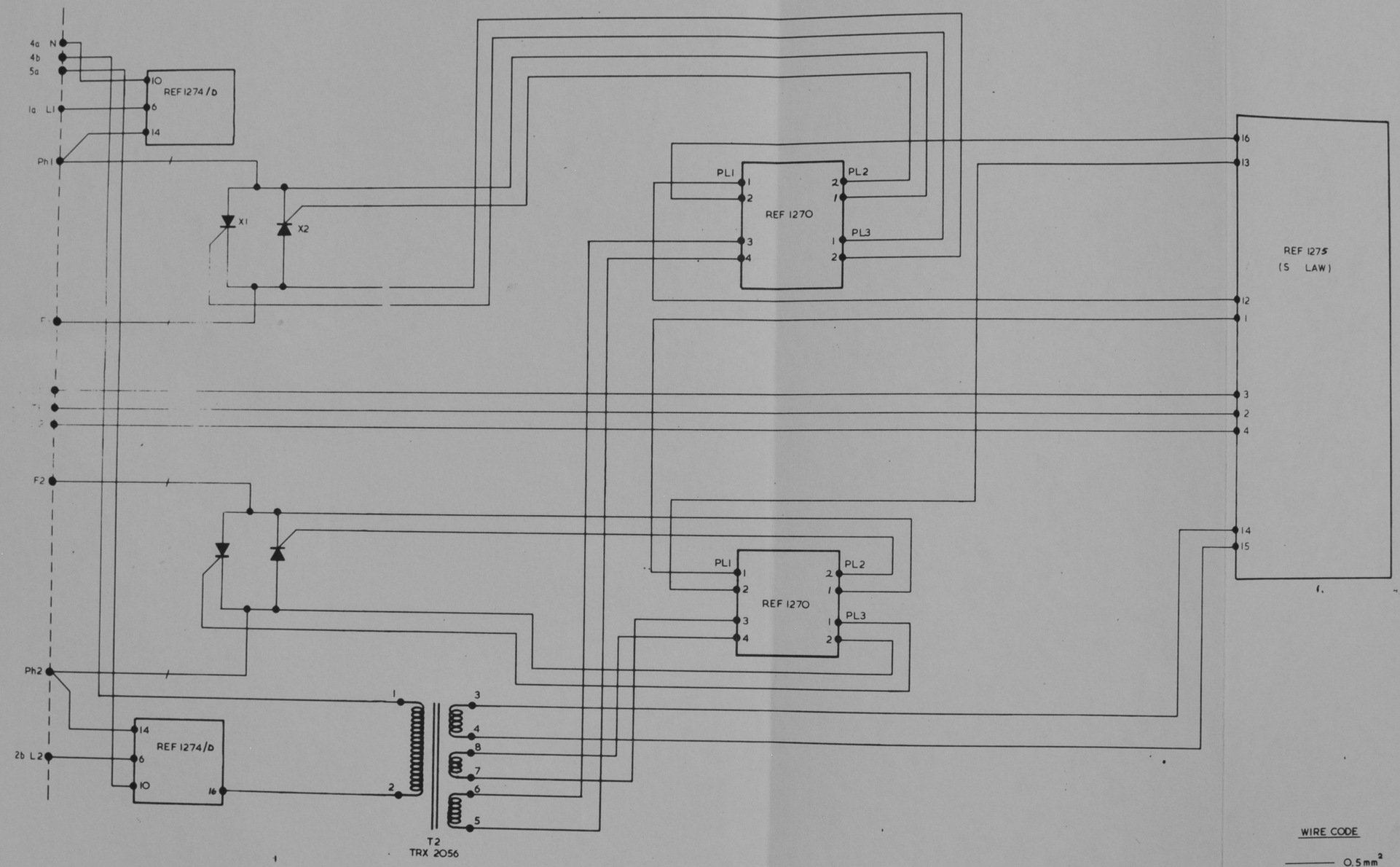
USED ON - 1S20611
1L19753

	—	DATE
SCALE		
DRAWN	D LASSMAN	18 4 78
CHECKED	E.P.LOCKWOOD	21/4/78
APPROVED		21-4-78
MATERIAL		
FINISH -		

TITLE
M.C.M. 100
OPEN LOOP MODULE
CIRCUIT DIAGRAM.

ISSUE A1 | DWG. Nº 7C 21701

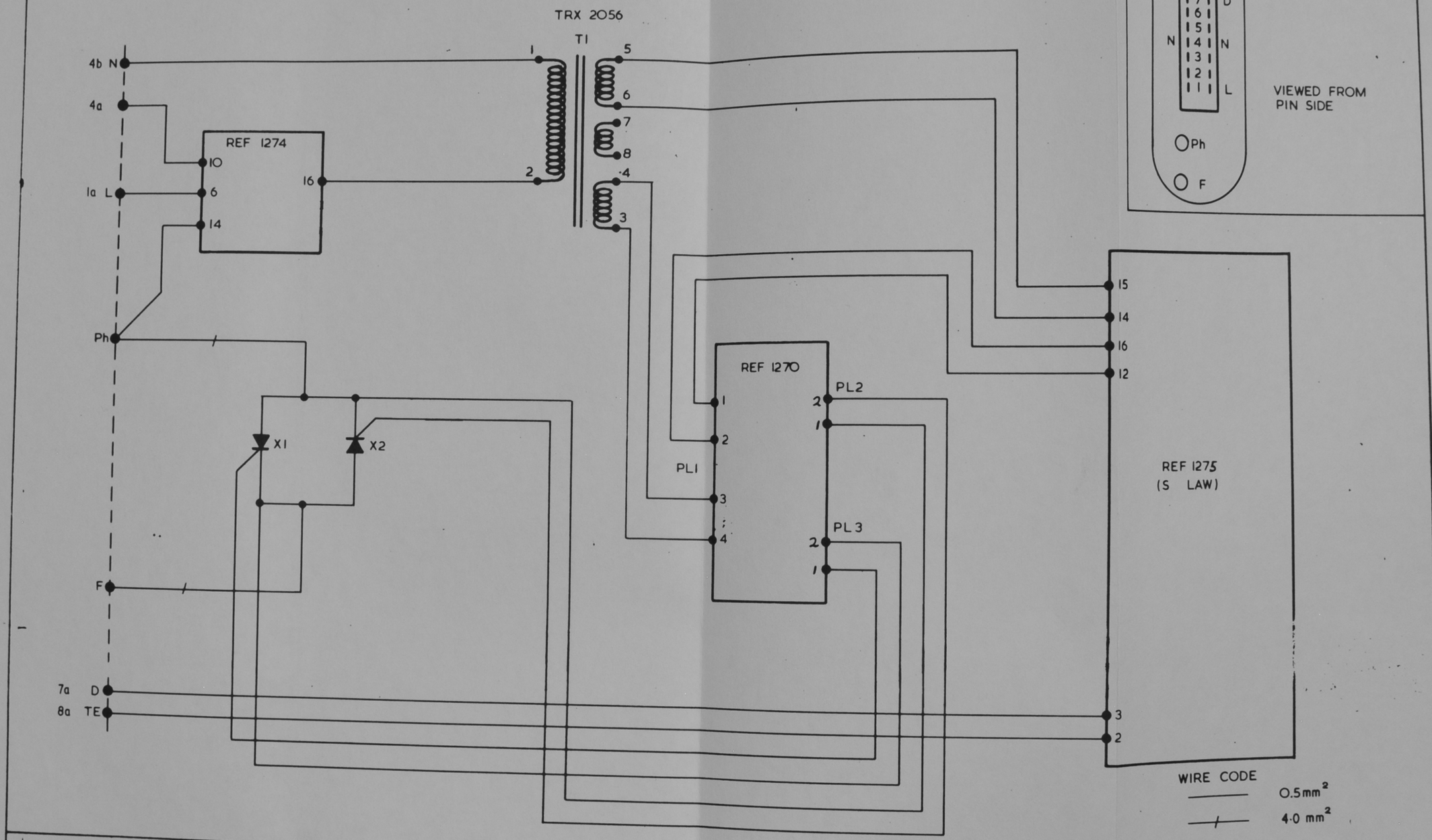
DWG. Nº 7B21594 | ISSUE X Bc



REV.1 S.No
C Re 1270 to
Ref 1274

RANK STRAND ELECTRIC PO BOX 70 Great West Road Brentford Middlesex TW8 9HR Telephone 01-568 9222 Telex 27976 A DIVISION OF RANK AUDIO VISUAL LIMITED	TOLERANCES IMPERIAL / METRIC FRACTION ± 1/64" / 1 DEC PLACE ± 0·4mm DECIMAL ± ·005" / 2 DEC PLACE ± 0·1mm ANGULAR ± 0·25° UNLESS OTHERWISE STATED USED ON:- MCM 1L 19753	SCALE — DRAWN D Lassman DATE 15-4-78 CHECKED APPROVED 31/10/78 MATERIAL:- FINISH:-	TITLE:- MCM 25 BLOCKING OSC. MODULE CIRCUIT DIAGRAM
DIMENSIONS IN INCHES/MILLIMETRES THIRD ANGLE PROJECTION			ISSUE X Bc / DWG. Nº 7B21594

DWG. Nº 7C21503 | ISSUE A B



REV.1 C.Nº

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Telephone 01-568 9222 Telex 27976
A DIVISION OF
RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4mm
DECIMAL ± 005"	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

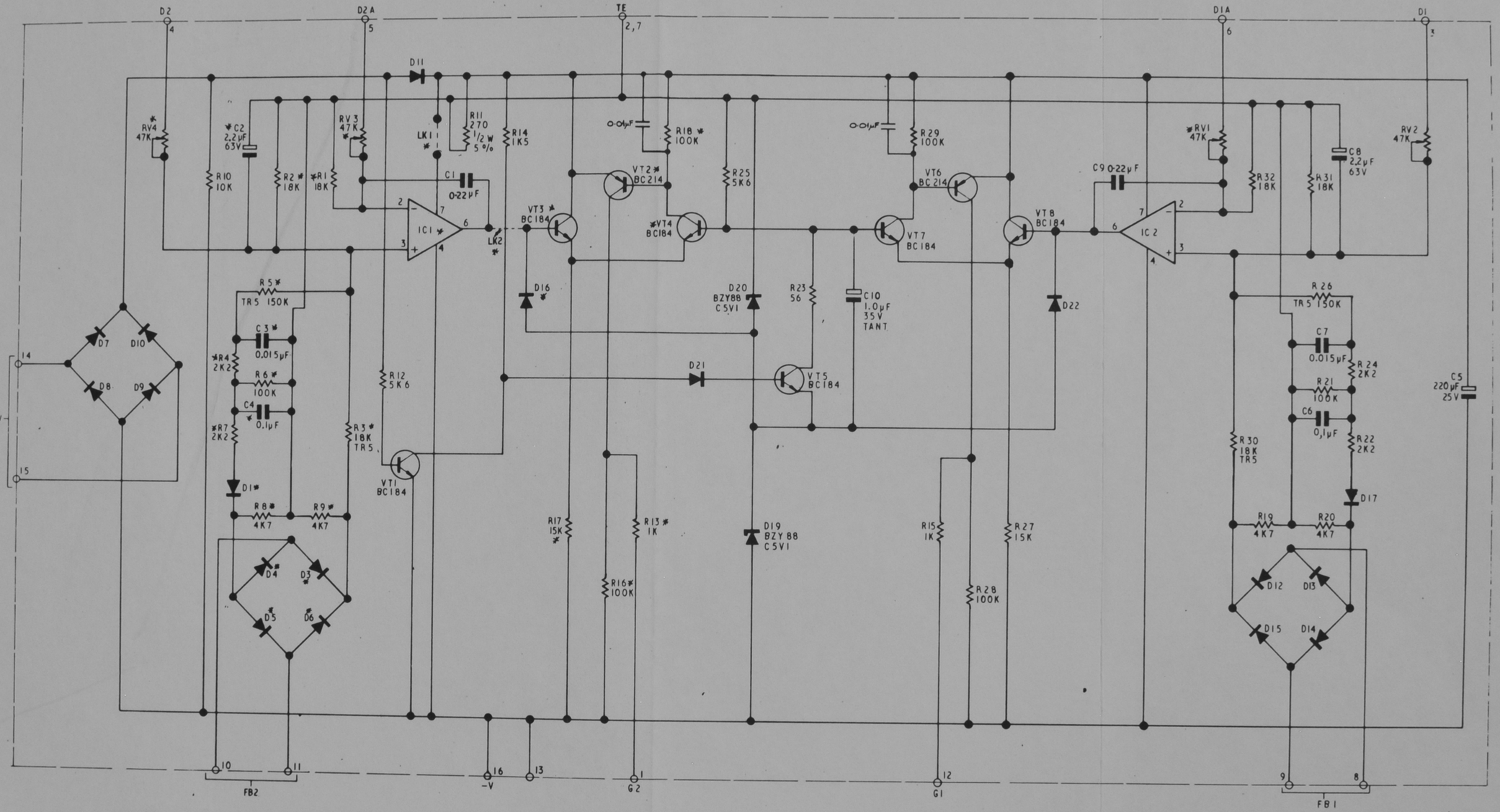
USED ON :-
MCM 1L19753

SCALE	——	DATE
DRAWN	D Lassman	14-4-78
CHECKED		
APPROVED		31/10/78
MATERIAL :-		
FINISH :-		

TITLE :-
MCM 50 BLOCKING OSC, MODULE. CIRCUIT DIAGRAM.

ISSUE A B | DWG. Nº 7C21503

DWG. No 5819754 | ISSUE *A B C D E F 2



SCHEDULE 5S19755
PC BOARD 5B19938

COMPONENTS MARKED '*' NOT USED ON REF 1272/D SCHEDULE 5S20653

ALL IC'S ARE SN 72741P.
ALL DIODES ARE IS920.
ALL RESISTORS 1/3W 5% CR25 EXCEPT WHERE OTHERWISE STATED.

REV 1 CN E3481 Drawing amended to suit PCB no. 1 & 2 DLG 26-6-79
REV 2 E3261 Drawing brought into line with artwork DLG 26-6-79
REV 3 E2864 PC Board was 5C19108 Raised to Production Issue KR C&D 4-3-78

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DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4 mm
DECIMAL ± ·005"	2 DEC PLACE ± 0·1 mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

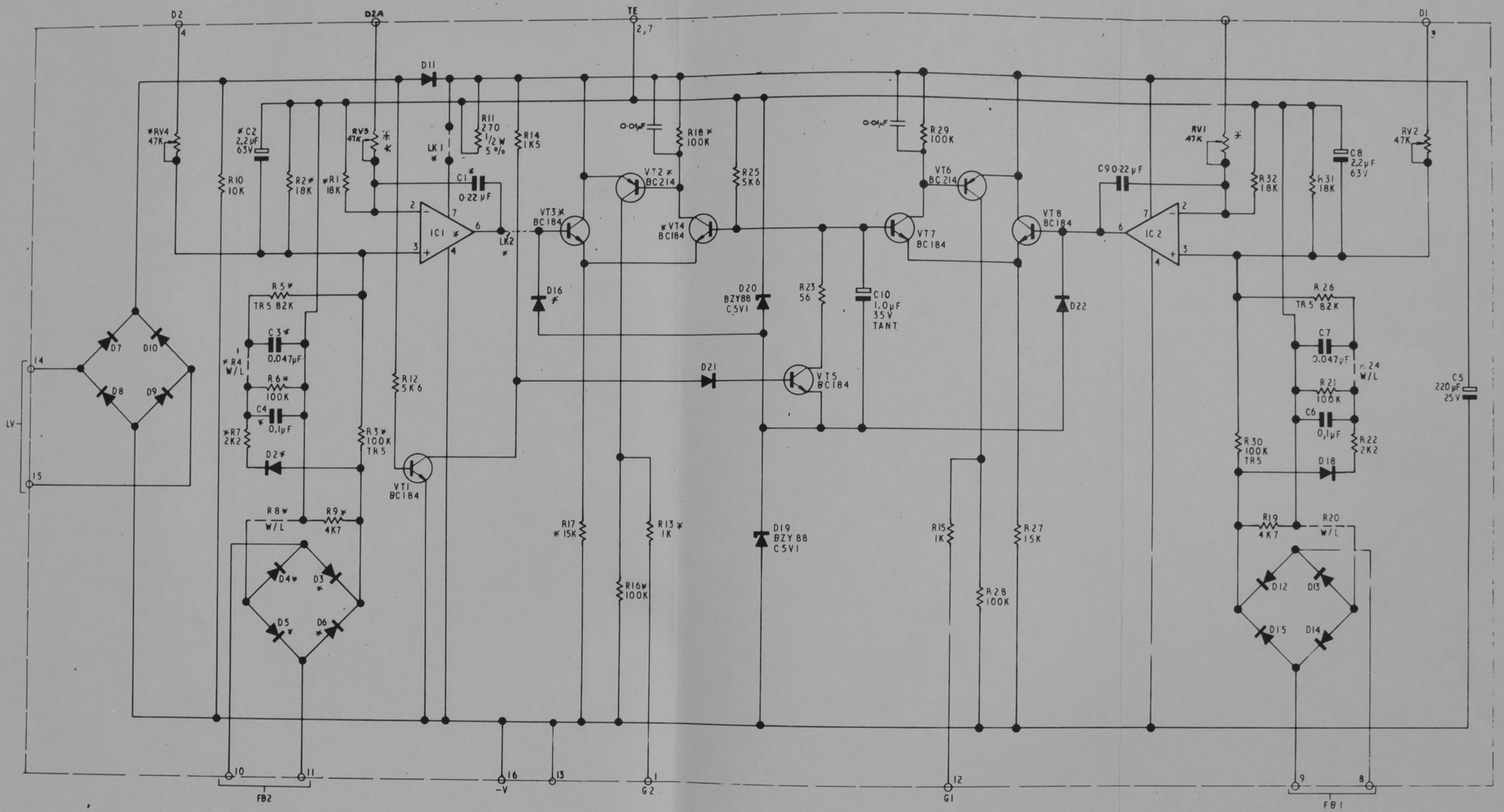
USED ON:- MCM DIMMER 1L19753

		DATE
SCALE		
DRAWN	K.P.M.	
CHECKED	E.P. LOCKWOOD	26/1/78
APPROVED		7-3-78
MATERIAL:-		
FINISH:-		

TITLE:-
MCM SERIES DIMMER
DUAL TRIGGER CARD CLOSED LOOP SQ LAW
CIRCUIT DIAGRAM
PCB 566/3 REF 1272

ISSUE 2 *A B C D E F | DWG. No 6819754

DWG Nº 6B19706 | ISSUE ~~A B C D~~ E 1 2 3



SCHEDULE 5S19707
PC BOARD 5B19938

COMPONENTS MARKED * NOT USED ON REF 1273/D SCHEDULE 5S20654
" " # USED ON POSITIVE VOLTAGE CONTROL ONLY

ALL IC'S ARE SN 72741P.
ALL DIODES ARE IS 920.
ALL RESISTORS 1/3 W ±5% CR25 EXCEPT WHERE OTHERWISE STATED.

REV 1 C.N.E2304 ~~DRAWING AMENDED~~ D.E. 10-5-78
REV 2 E2761 DRAWING REDRAWN INTO LINE WITH ARTWORK D.L.C. 26-6-79
REV 3 C.N.E2868 PC BOARD Nº WAS SC 19708 DRG RAISED TO PRODUCTION ISSUE K.R. C.N.D. 5-9-79
REV 4 C.N.E2909 REV 3 NOTE ~~REF 1273/C~~ 1273/D D.E. 19-3-79

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P.O. Box 70 Great West Road Brentford Middlesex TW8 9HR
Telephone [illegible] Telex 27976
A DIVISION OF
RANK AUDIO VISUAL LIMITED

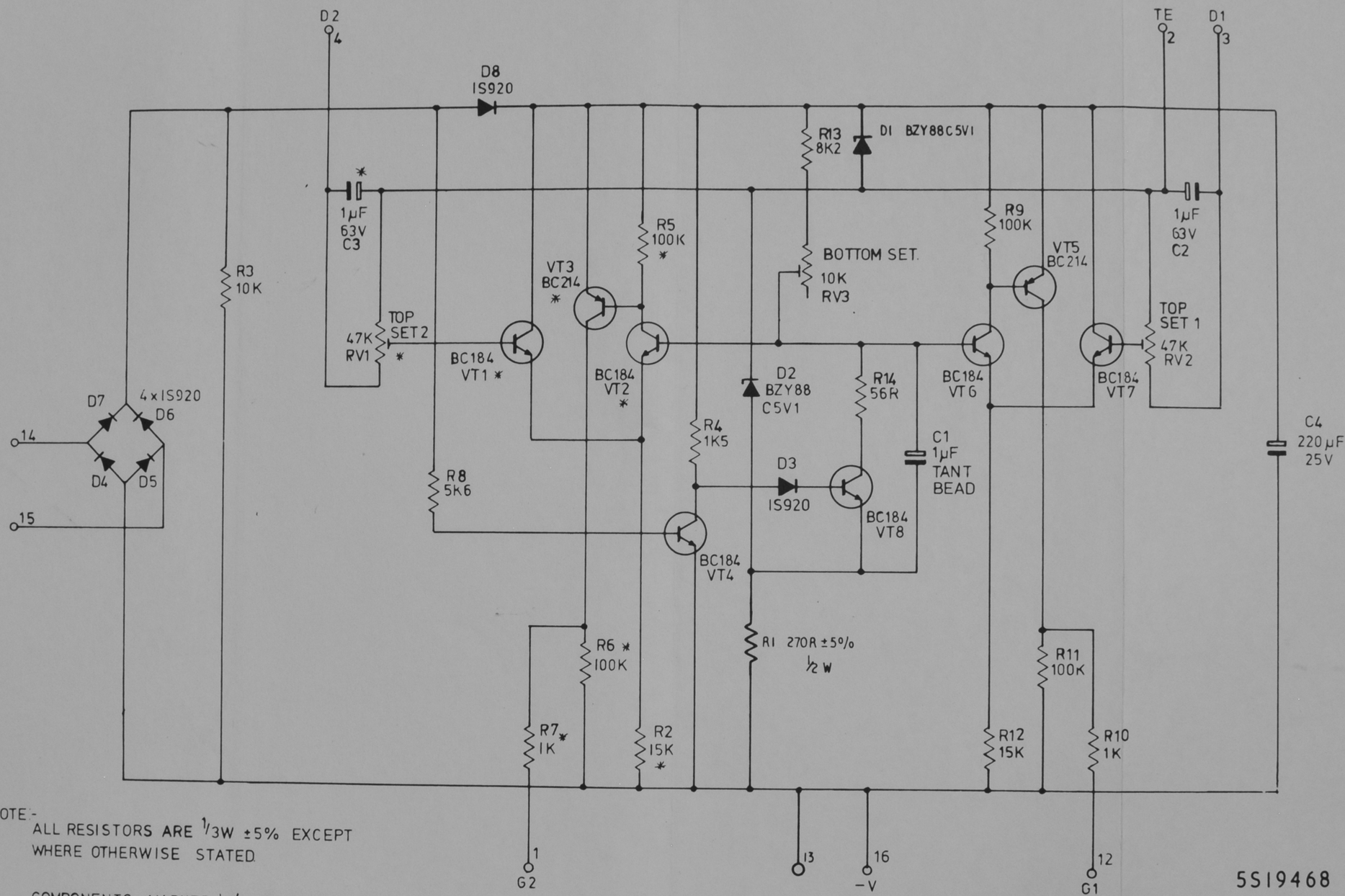
DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES		SCALE		DATE
IMPERIAL	METRIC	DRAWN	K.P.M.	
FRACTION ± 1/64"	1 DEC PLACE ± 0·4 mm	CHECKED	E.P. Lockwood	7/3/79
DECIMAL ± 005"	2 DEC PLACE ± 0·1 mm	APPROVED	[illegible]	7-3-79
ANGULAR ± 0·25°		MATERIAL :-		
UNLESS OTHERWISE STATED				
USED ON :-		FINISH :-		

TITLE :-
MCM SERIES DIMMER
DUAL TRIGGER CARD CLOSED LOOP LIN LAW
CIRCUIT DIAGRAM
PCB 566/3 REF 1273

ISSUE ~~A B C D~~ E 3 | DWG. Nº 6B19706

DWG. Nº 6C19467 | ISSUE A B C D E 1,



NOTE -
ALL RESISTORS ARE 1/3W ±5% EXCEPT WHERE OTHERWISE STATED.

COMPONENTS MARKED * NOT USED ON REF 1275/D SCHEDULE 5S20656

5S19468 SCHEDULE
5B19937 P.C. BOARD

REV 1 C.Nº E3361 DRAWING APPROVED B.E.NASH 10-3-78
REV 2 E3261 DRAWING BROUGHT INTO LINE WITH ARTWORK D.P.S. 26-6-78
REV 3 E2868 P.C. BOARD Nº WAS 5C19469 RAISED TO PRODUCTION ISSUE KR LAD 5-9-78

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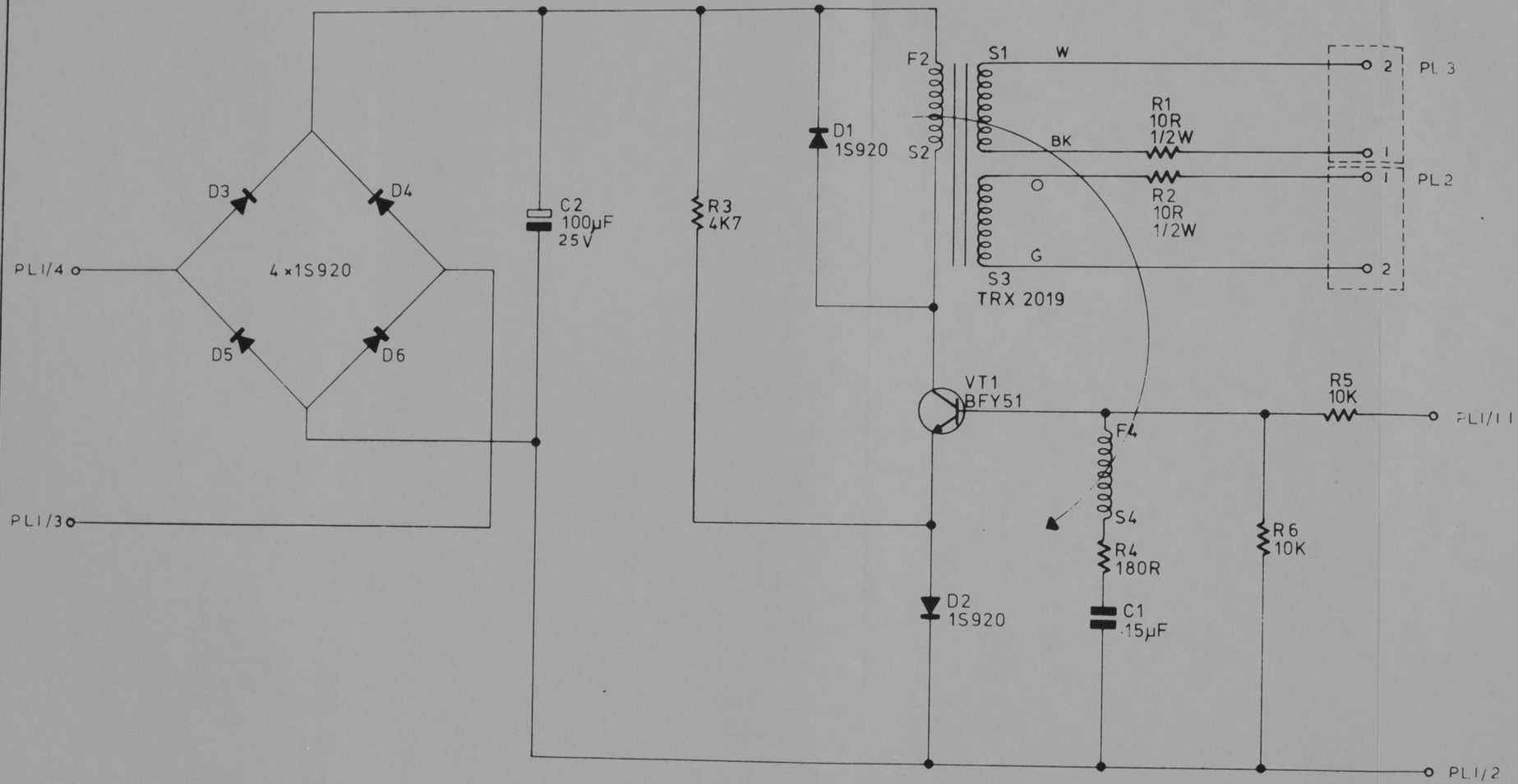
DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES			SCALE	-	DATE
IMPERIAL	METRIC		DRAWN	Rother	14·6·77
FRACTION ± 1/64"	1 DEC PLACE ± 0·4mm		CHECKED	E.P.LOCKWOOD	6/1/78
DECIMAL ± ·005"	2 DEC PLACE ± 0·1mm		APPROVED		7-3-78
ANGULAR ± 0·25°			MATERIAL :-		
UNLESS OTHERWISE STATED					
USED ON :- MCM DIMMER 1L19753			FINISH :-		

TITLE :-
MCM SERIES
DUAL OPEN LOOP
TRIGGER CIRCUIT.
PCB 554.13 REF 1275

ISSUE A B C D E 1, | DWG. Nº 6C19467

DWG. N° 6C21039 | ISSUE A B



SCHEDULE 5S21146

REV.1 C.N°E3200 RELEASE FOR PRODUCTION 14.9.78

RANK STRAND ELECTRIC
P.O. Box 70, Great West Road, Brentford, Middlesex TW8 9HR
Telephone 01-568 9... Telex 27976
A DIVISION OF
RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4mm
DECIMAL ± ·005"	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

USED ON :- M.C.M DIMMER 1L19753

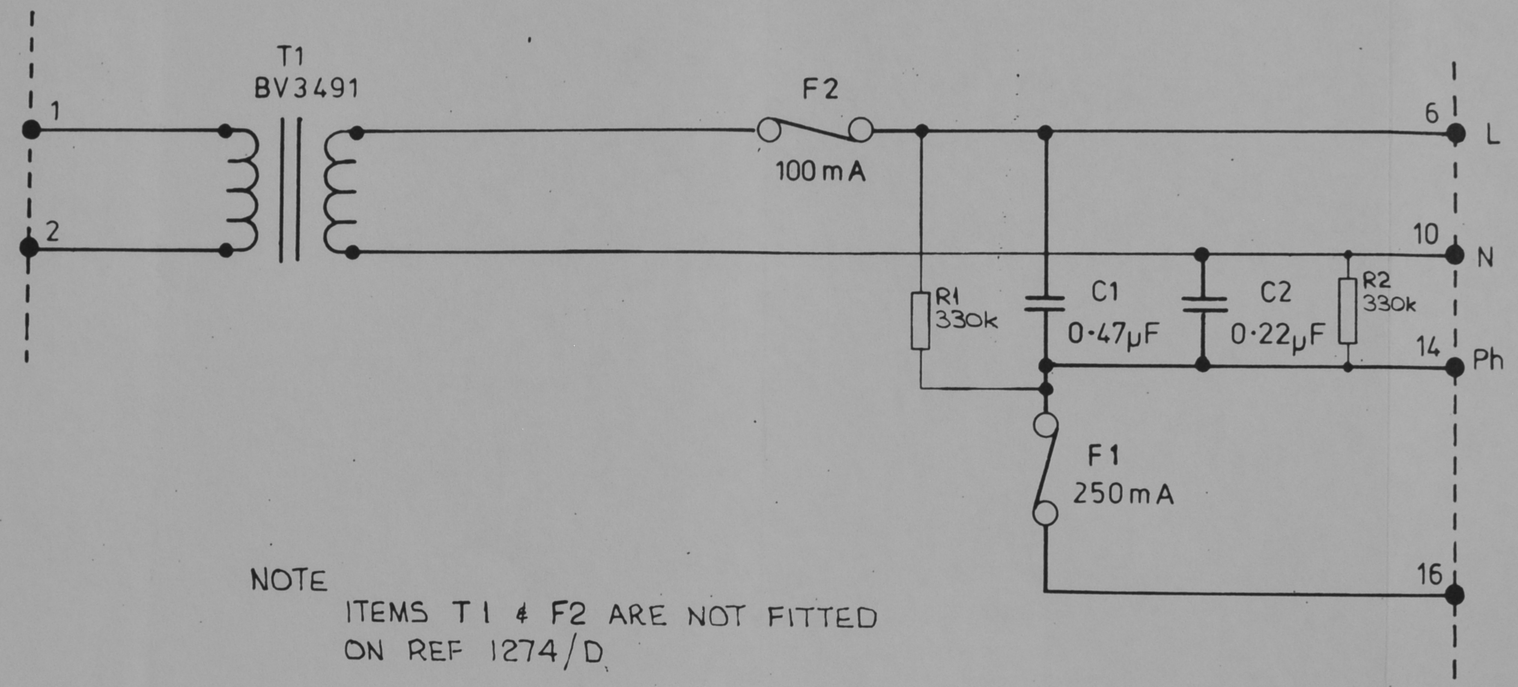
SCALE		DATE
DRAWN	S.A.B	16-1-78
CHECKED	F.P.LOCKWOOD	13-4-78
APPROVED		19 4 78
MATERIAL :-		
FINISH :-		

TITLE :- MCM BLOCKING OSCILLATOR CARD CIRCUIT DIAGRAM

REF 1270 PCB 594

ISSUE A B DWG. N° 6C21039

DWG. Nº 6D19773 | ISSUE A,B,C,D,2



NOTE

ITEMS T1 & F2 ARE NOT FITTED
ON REF 1274/D.

SCHEDULE 5520655
REF 1274/D P.C. BOARD 5B19775

REF 1274 SCHEDULE 5S19774
P.C BOARD 5B19775.

REV.1. C.Nº E3181 DRAWING APPROVED b.E.Nash. 10-3-78

REV 2 C.Nº E2868 NOTE ADDED DRG RAISED TO PROD ISSUE KR 14-9-78

RANK STRAND ELECTRIC
PO Box 70 Great West Road Brentford Middlesex TW8 9HR
Telephone 01-568 9222 Telex 27976
A DIVISION OF
RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4mm
DECIMAL ± ·005"	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

USED ON :- IL19753

SCALE		DATE
DRAWN	G.HAYWARD	1·10·77
CHECKED	E.P.LOCKWOOD	9-3-78
APPROVED	A.B.Bunney	10-3-78

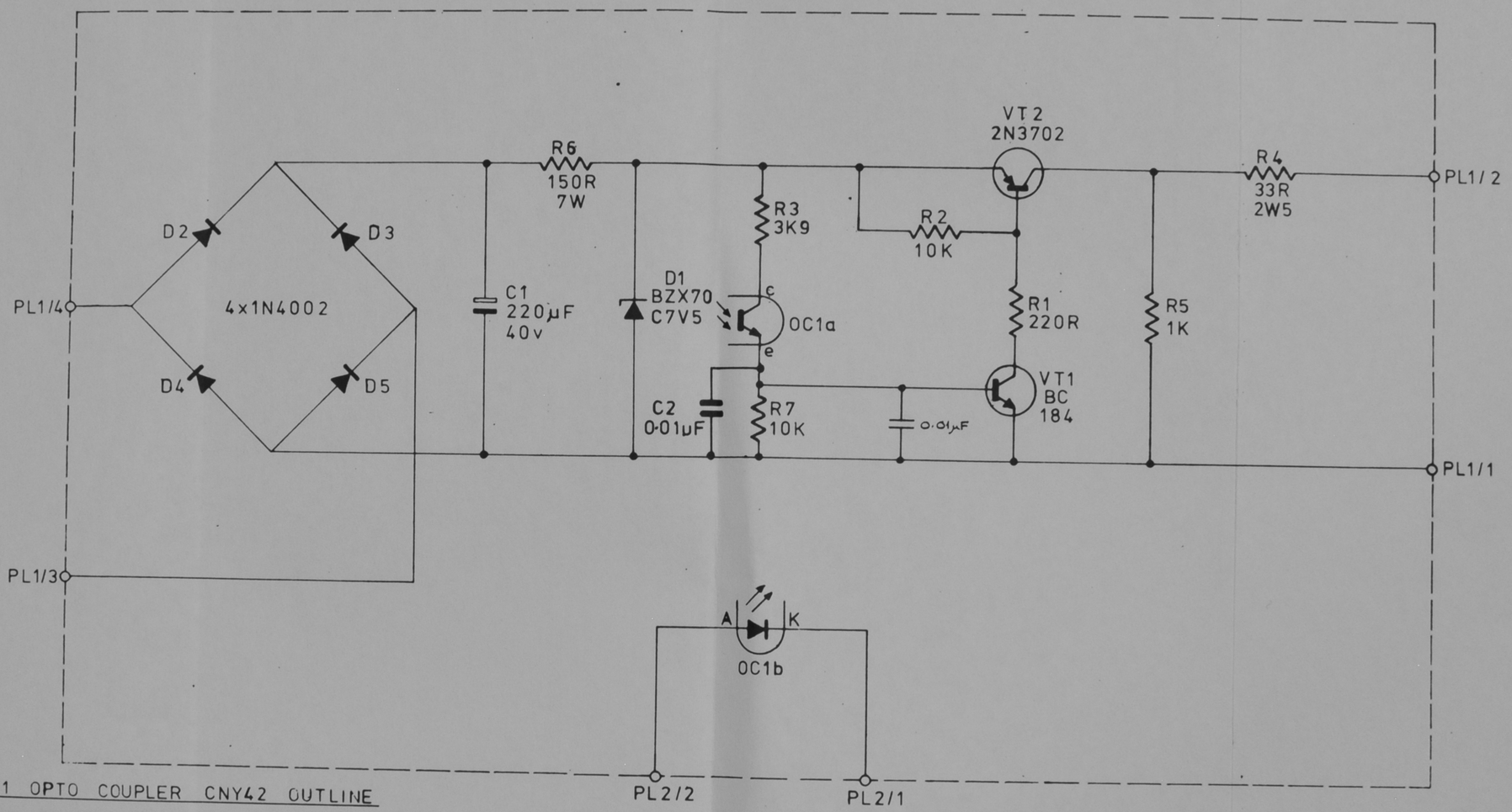
MATERIAL :-

FINISH :-

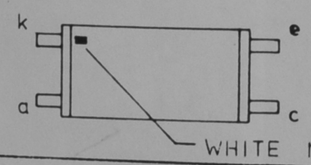
TITLE :-
M.C.M. RFI CARD
CIRCUIT DIAGRAM.
P.C.B 567 REF 1274

ISSUE A,B,C,2 | DWG. Nº 6D19773

DWG. Nº 6C19750 | ISSUE ~~A B C~~ 1 2 3



OC1 OPTO COUPLER CNY42 OUTLINE



SCHEDULE 5S19751
P.C.BOARD 5C19752

REV 1 C.N°E3981 DRAWING APPROVED L.E.NASH. 10-3-78
REV 2 C.N°E2868 RAISED TO PRODUCTION ISSUE K.R. 5.9.78

RANK STRAND ELECTRIC
A DIVISION OF
RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4 mm
DECIMAL ± ·005	2 DEC PLACE ± 0·1 mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	

USED ON: MCM DIMMER 1L19753

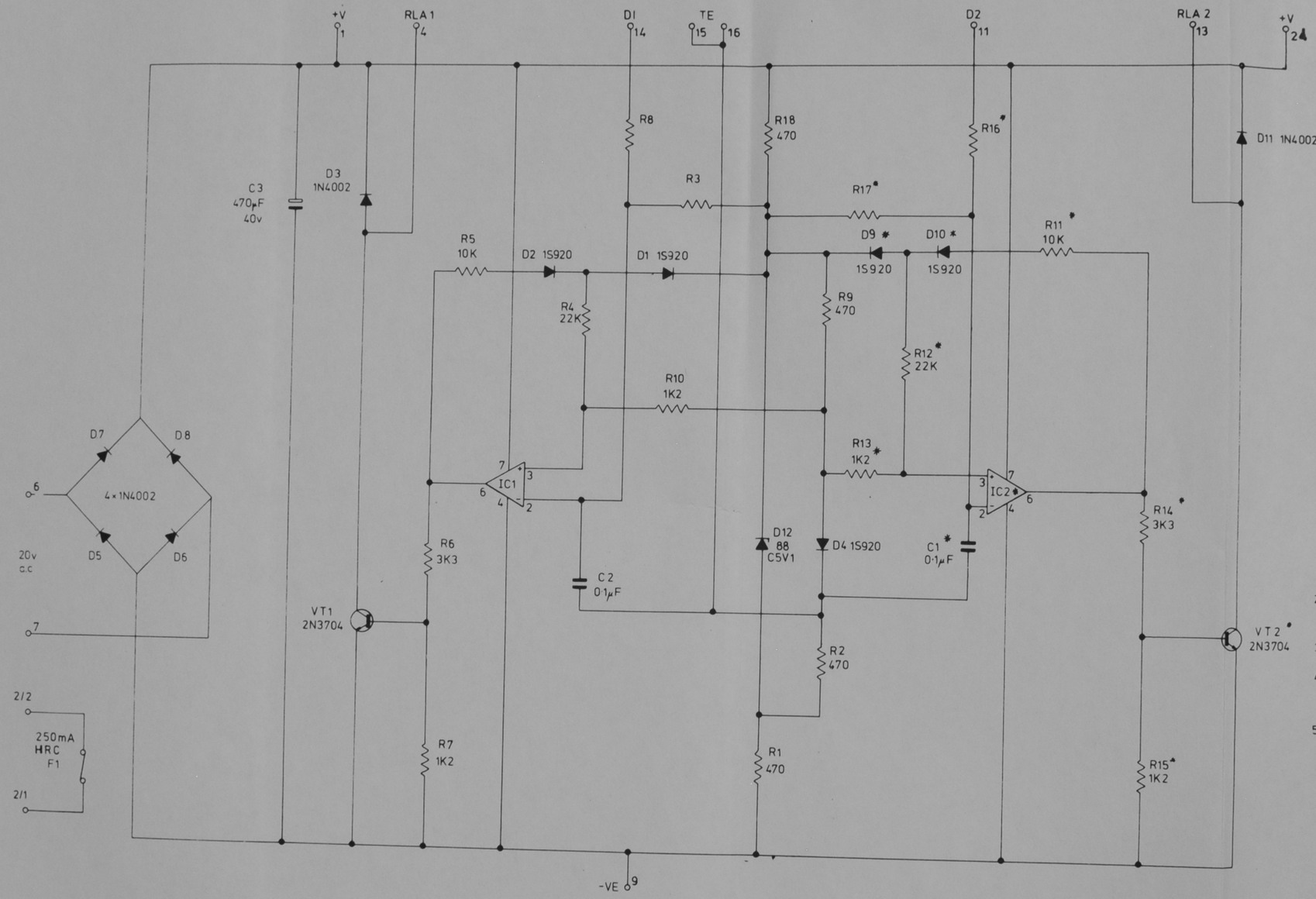
		DATE
SCALE		
DRAWN	S.A.B	30.9.77
CHECKED	E.P.LOCKWOOD	28/2/78
APPROVED		7-3-78
MATERIAL		
FINISH		

TITLE: MCM DIMMER GATE DRIVE CARD CIRCUIT DIAGRAM

PCB 551/3 REF 1276

ISSUE ~~A B C~~ 1 2 3 | DWG. Nº 6C19750

DWG. Nº 6B22972 | ISSUE C



SWITCHING LEVEL AJUSTMENT ASSUMING R.S.E STANDARD INTERFACE 0→-10v VIA 10K AND SILICON DIODE

SWITCH LEVEL	R.8,16	R.3,17
5%	1K	56K

NOTES

1/ IF DIODE NOT USED IN CONTROL INTERFACE THEN D.12 TO BE REPLACED BY WIRE LINK

2/ COMPONENTS MARKED * NOT FITTED ON REF 1267/D

3/ IC1, 2 ARE SN72741P

4/ ALL RESISTORS 1/3W 5% CR25 UNLESS OTHERWISE SPECIFIED

5/ R 8, 16, 3 & 17 TO BE MOUNTED ON TERMINAL PINS

TEST INSTRUCTIONS: 1T 23658
SCHEDULE : 5S23641
DRILLING DWG : 5B23640

REV. | C.Nº

RANK STRAND ELECTRIC
PO BOX 70 Great West Road Brentford Middlesex TW8 9HR
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A DIVISION OF
RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4mm
DECIMAL ± 005"	2 DEC PLACE ± 0·1mm
ANGULAR ± 0·25°	

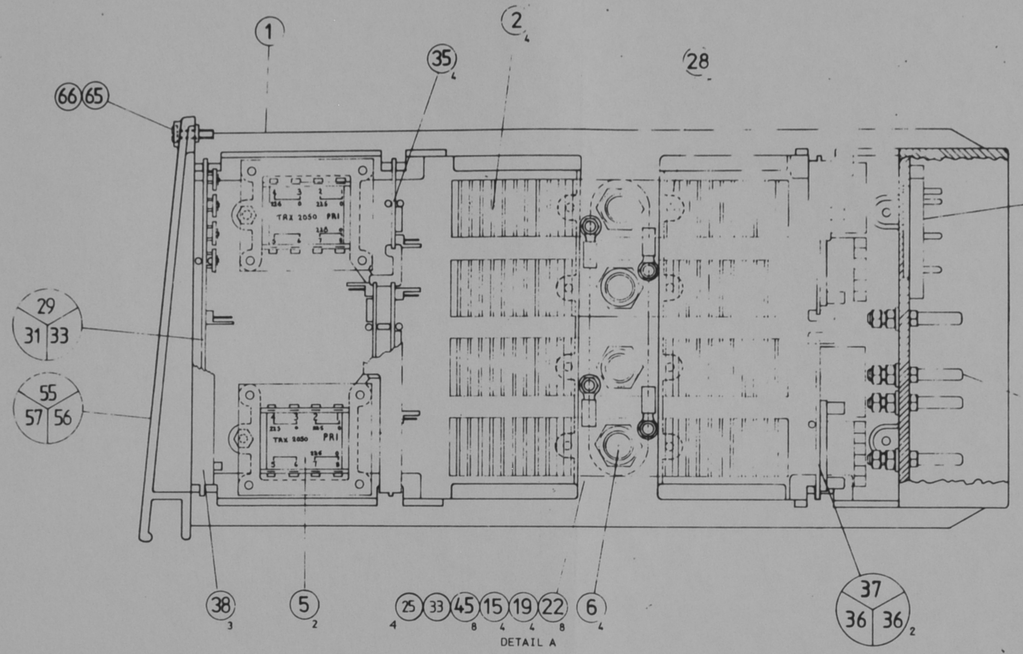
UNLESS OTHERWISE STATED
USED ON:- MCM NON-DIM
DWG. LIST: 1L23657

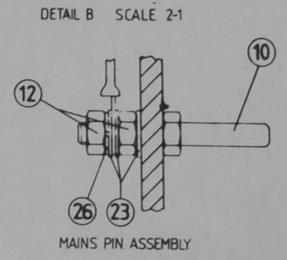
		DATE
SCALE		
DRAWN	J.P.D	20.10.78
CHECKED		19/2/79
APPROVED		19-2-79

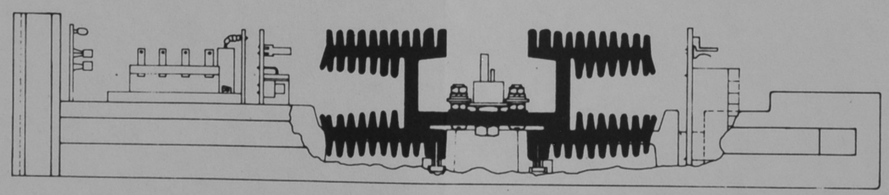
MATERIAL:-
FINISH:-

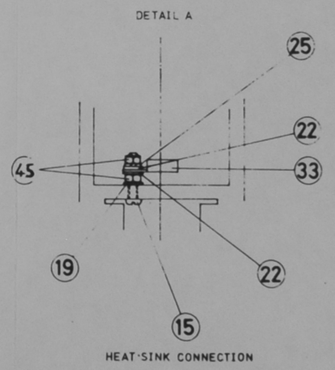
TITLE:-
MCM DUAL NON-DIM CARD
PCB: 685/2 REF: 1267
ISSUE C DWG. Nº 6B22972

DWG. No [illegible] ISSUE A B 1









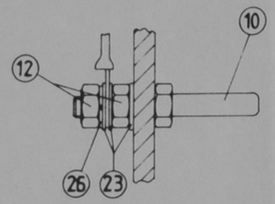
NOTE
ITEM NUMBERS SHOWN RELATE TO MODELS AS FOLLOWS S CL CS

SCHEDULE 1S20611

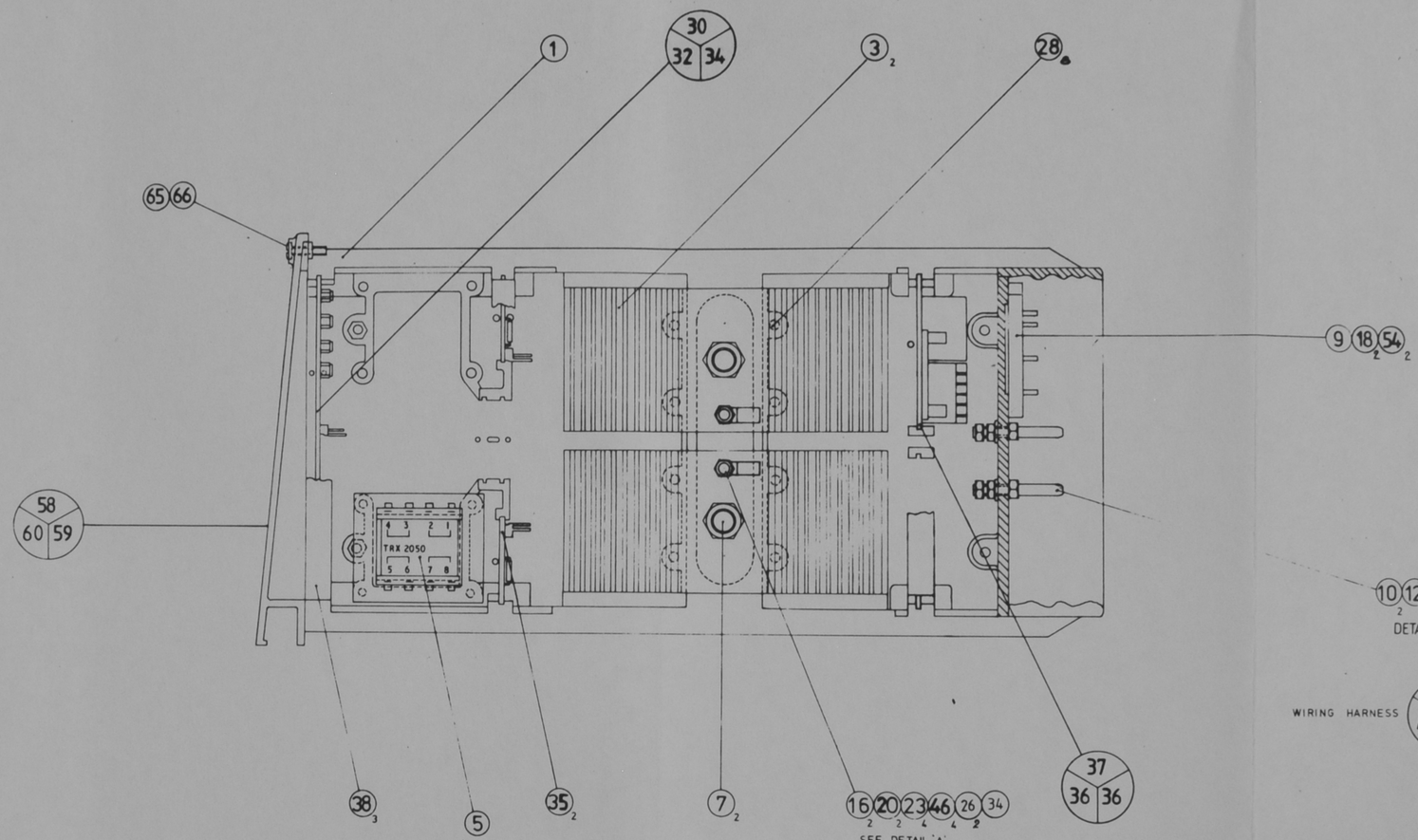
RANK STRAND ELECTRIC	TOLERANCES IMPERIAL / METRIC	ALL 1/1	DATE	MCM 25 DIMMER MODULE ASSEMBLY	
RANK AUDIO VISUAL LIMITED		DRAWN S A B	2/11/77		
DIMENSIONS IN INCHES IN THIRD ANGLE PROJECTION	USED ON MCM	CHECKED		ISSUE A B 1	DWG. No 1A20609
		APPROVED			
		MATERIAL			
		FINISH			

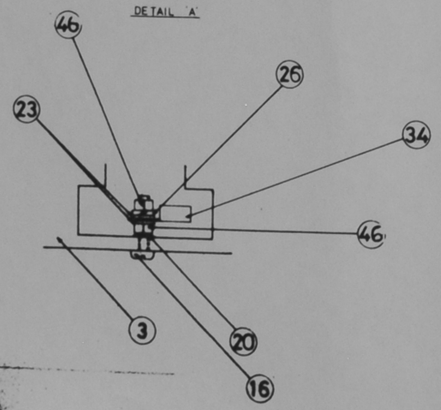
DWG NO 1A20610 | ISSUE #3 1

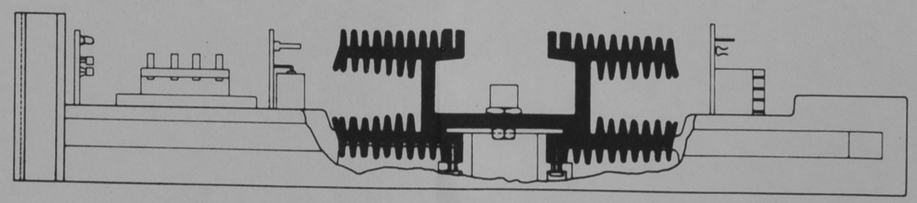
DETAIL B SCALE 2-1



MAINS PIN ASSEMBLY







NOTE
ITEM NUMBERS SHOWN RELATE TO MODELS AS FOLLOWS S CL CS

HEAT SINK CONNECTION

SCHEDULE 1S20611

RANK STRAND ELECTRIC
A DIVISION OF RANK AUDIO VISUAL LIMITED

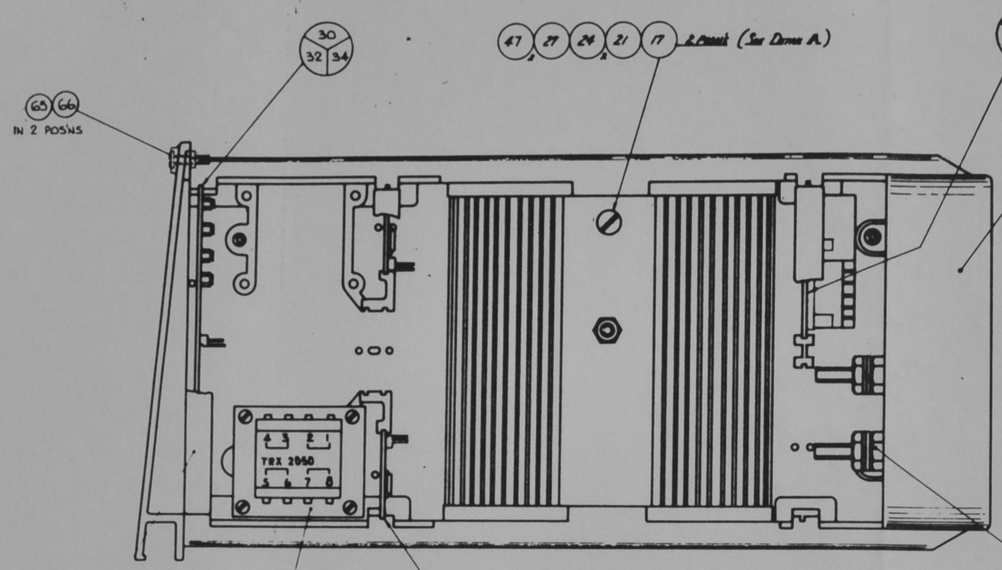
TOLERANCES		SCALE		DATE
IMPERIAL	METRIC	DRAWN	D.P.L.	2/11/78
FRACTION ± 1/64"	1 DEC PLACE ± 0.4mm	CHECKED		8/12/78
DECIMAL ± .005"	2 DEC PLACE ± 0.1mm	APPROVED		8/12/78
ANGULAR ± 0.25°		MATERIAL -		
UNLESS OTHERWISE STATED				
USED ON:-		FINISH -		

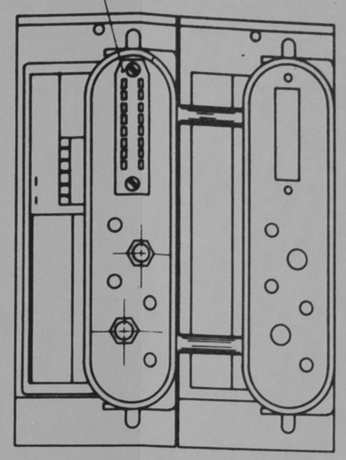
TITLE -
MCM 50 DIMMER MODULE ASSEMBLY.

ISSUE #3 1

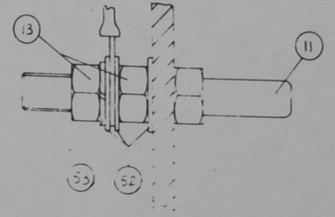
DWG NO 1A20610

DWG NO M2/592 | ISSUE #B1

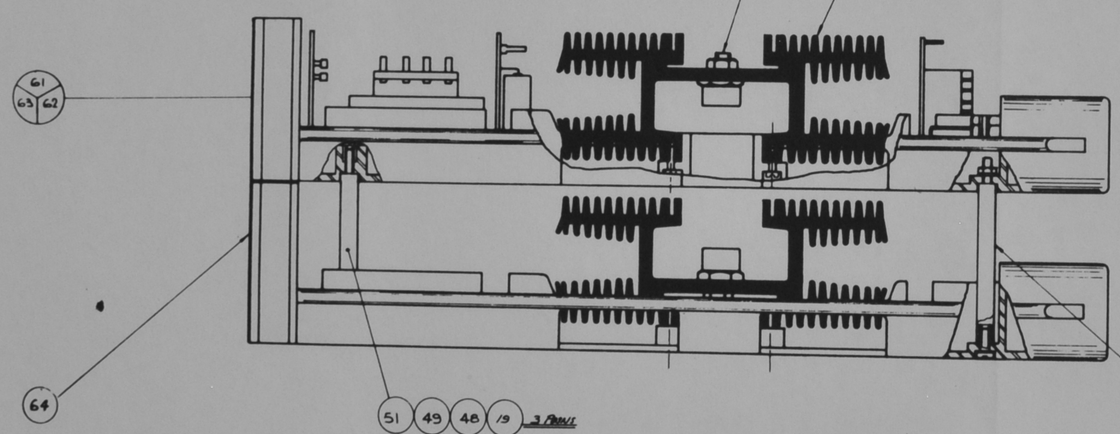


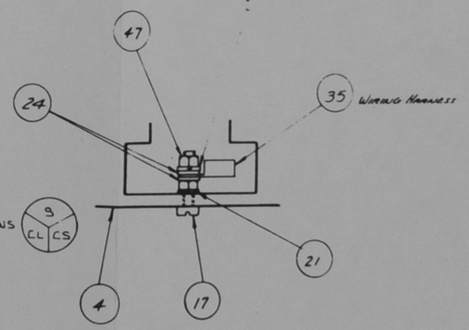


DETAIL B SCALE 2:1



MAINS PIN ASSEMBLY





DETAIL A

NOTE
ITEM NUMBERS SHOWN RELATE TO MODELS AS FOLLOWS CL / CS

WIRING HARNESS

SCHEDULE 1320611

RANK STRAND ELECTRIC A DIVISION OF RANK AUDIO VISUAL LIMITED	TOLERANCES IMPERIAL / METRIC FRACTION ± 1/64" 1 DEC PLACE ± 0·4mm DECIMAL ± ·005" 2 DEC PLACE ± 0·1mm ANGULAR ± 0·25° UNLESS OTHERWISE STATED USED ON:- MSM M/8753	SCALE / APP. SIZE DRAWN CHECKED APPROVED MATERIAL:- SCHEDULE 1320611 FINISH:-	DATE TITLE:- MCM 100 Dimmer Modules Assy
DIMENSIONS IN INCHES/MILLIMETRES THIRD ANGLE PROJECTION		ISSUE #B1	DWG. No M2/592