4.00 Installation

Under normal circumstances the Series 1624 will be freighted in two wooded cases, containing the following items:-

Large Case

1 x console

1 x stand cross member

Small Case

1 x R.H. Leg

1 x L.H. Leg

1 x PSU

1 x 8 core PSU lead

1 x 3 core PSU lead (mains)

10 x TT patch cords

15 x M6 x 14mm bolts

Technical information

3 x 3.15A fuse

3 x 6.3A fuse

20 x M3.5 x 8mm screw

20 x M3.5 nylon washer

4.01 Assembly

Having identified all the above parts proceed with assembly as follows:-

a. Slot stand cross-member into left hand leg and secure it with three M6 x 14mm bolts.

b. Repeat for right hand leg.

c. Position stand in required position and lift console onto the legs securing it with eight M6 x 14mm bolts.

Wiring

All multitrack and effects interfaces are made on multiway connectors fitted to the rear of the console. Interconnection diagrams and mating connectors are included with the console.

Two track, phones, control room and studio connections are provided on XLR type connectors with pin 1 ground, 2 neutral (or ground if unbalanced) 3 live.

The following notes on grounding procedures are provided for your guidance.

4.02 General Wiring Procedures

a. Grouding external equipment

In general the best philosophy is to connect all screens at the console end of a screened cable and leave the external end floating, bringing back a separate earth cable from the external device to the console ground and leaving the external device disconnected from mains earth.

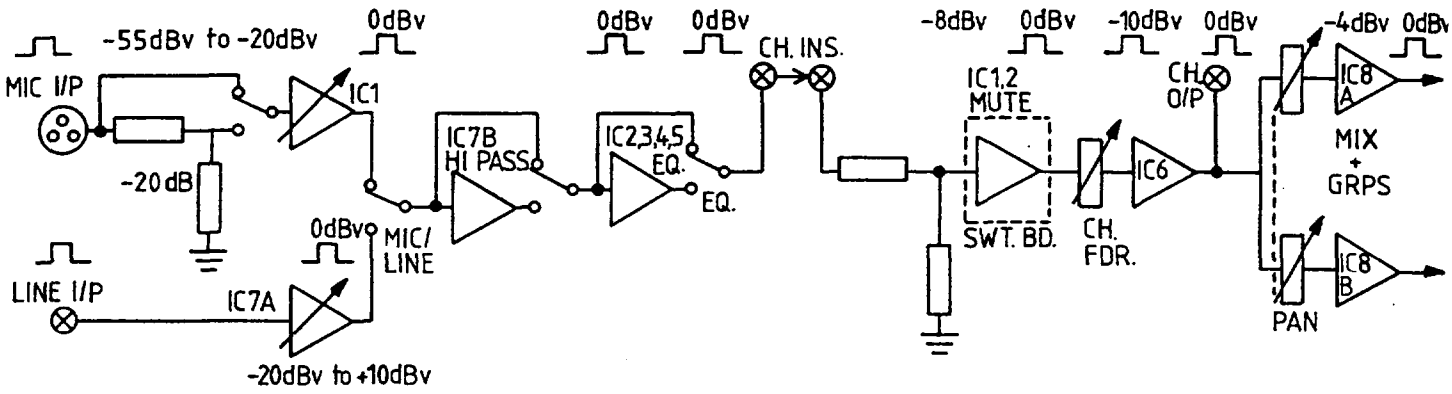
There are four distinct situations that may be encountered which are as follows:-

i) Console connection balanced, external connection balanced.
ii) Console connection balanced, external connection unbalanced.
iii) Console connection unbalanced, external connection balanced.
iv) Console connection unbalanced, external connection unbalanced.

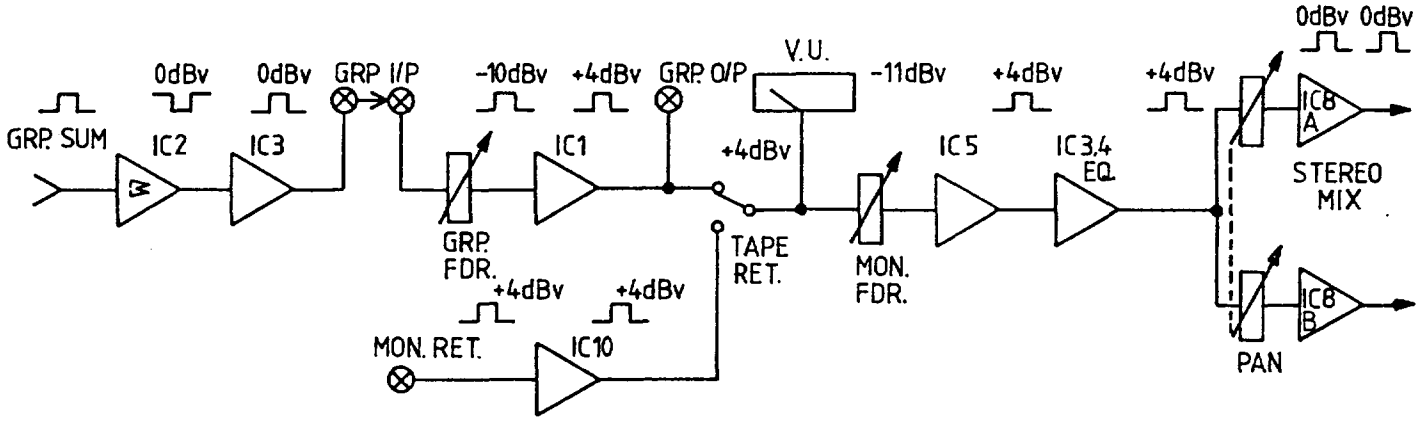
In situations (i) and (iv) proceed as already indicated. In (ii) simply unbalance the console feed by connecting the neutral line to console ground proceed as indicated. In (iii) use a twin screen cable and connect the live to console live, neutral to console ground and screen to console ground, at the external end leave the screen floating and connect neutral and live in the usual way and return a ground line to the console as before.

The PSU chassis is connected to the ground terminal of the mains input connector care should therefore be taken not to introduce earth loops if the PSU is bolted into a rack containing other equipment with chassis grounds.

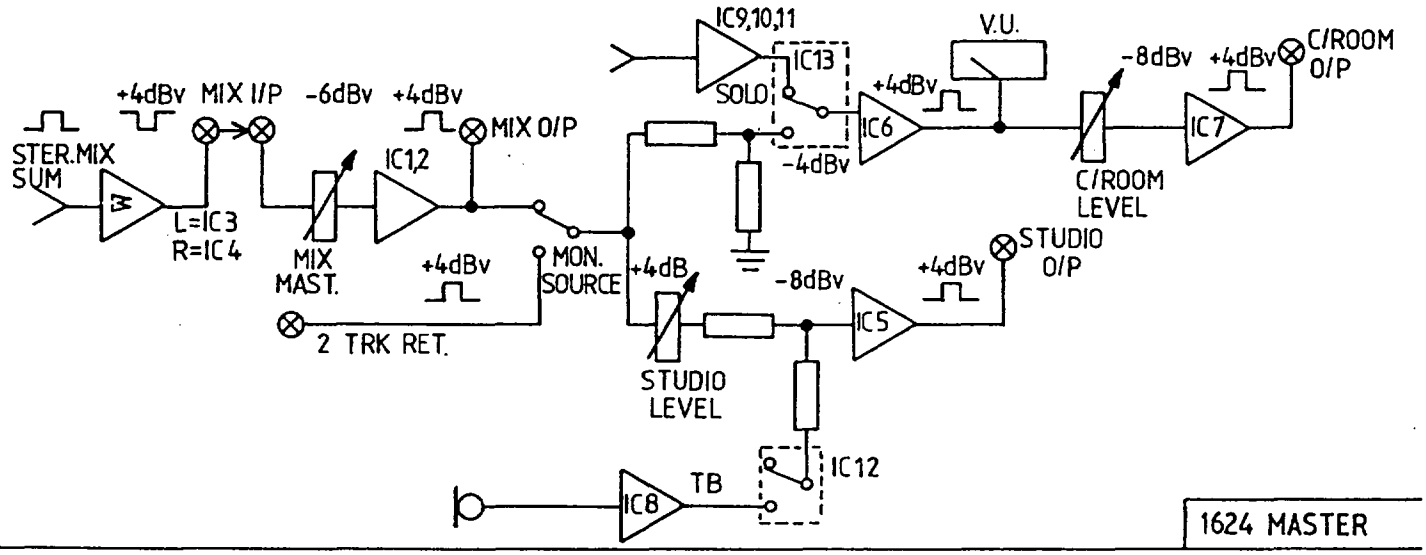
Having completed all the interconnections check that the PSU is set to the correct voltage and switch on.



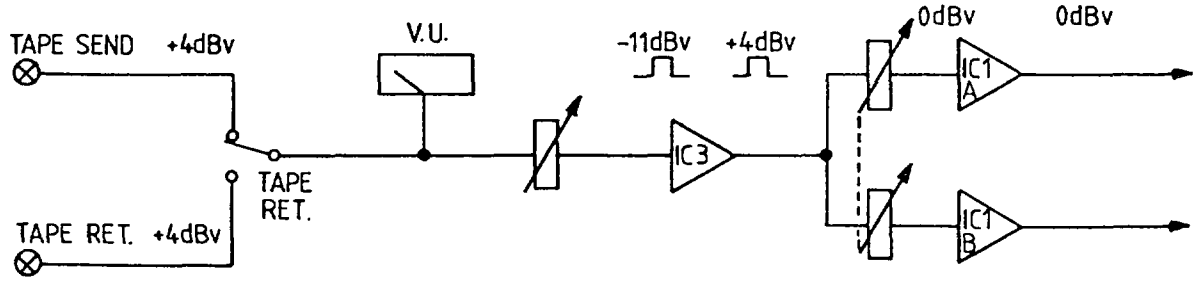
1624 INPUT



1624 GROUP/MONITOR



1624 MASTER



1624 24 TRACK MONITOR

5.00 Servicing.

Although the Series 1624 console has been designed for reliability, it is inevitable that occasional maintenance will be required. However, due to the amount of attention given to the problems of maintenance during the design stages of this console, and the modular construction, servicing tends to be extremely simple to carry out, with the minimum of test equipment.

5.01 General Fault Finding.

With the exception of the electronically balanced microphone amplifier, all signal electronics are configured around high slew rate, low noise integrated circuits. The microphone amplifier is a proprietory design, utilizing a discrete transistor, noise cancelling front end, differentially summed via a low noise integrated circuit.

The use of integrated circuits means that the majority of audio faults may be repaired by simply replacing the I.C. having first isolated the fault to a particular stage in the signed chain. The isolation can often be done without even removing the module from the console, by judicious use of the patchbay, and/or switching the module to various modes. As with all servicing, a good knowledge of the basic signal flow is necessary for best results. Each module should be viewed as a number of signal blocks, through which the signal must flow. If the signal appears at the input to a block, but not at the output, then the fault lies within that block. By dividing a module into individual sections, what at first appears

to be an extremely complicated piece of equipment can be simplified into simple sequential stages. This is the basic first move in all types of faultfinding, and usually requires nothing more than a small amount of logical thought. Servicing a mixing console is more a matter of clear thinking and having an understanding of what should be happening, than having a highly developed technical knowledge.

To illustrate the method of logical fault finding, let us assume that we have a non functioning input module, in both microphone and line modes.

The first step is to ensure that a fault really does exist! Check that the module is in the correct mode of operation, and that there are no jacks inserted in the patchbay, which may be interupting the signal flow.

If in doubt about the module operation, set up an adjacent module in exactly the same way, which will allow a direct comparison between a working and a possibly non-working module.

Route the channel directly to mix, so that the channel may be monitored in the normal way. Using the internal oscillator set to approximately 1 kHz, patch the oscillator signal into the channel line input.

If all is well, an undistorted signal should now be heard. More likely, because of the fault, it won't.

Large sections of the module circuiting can be bypassed by switching out the Hi Pass Filter, the Equaliser, or the Pan control. It switching out a section causes the signal to re-appear, then the fault is located in that section, which may then be traced at component level, by removing the module from the console frame,

and reconnecting it via the extender cables which are supplied with the console. See section 5.02.

With the module installed on the extender cables, access is now available to all parts of the module, and the signal may be traced through the various stages, using an oscilloscope, millivoltmeter, or even high impedance headphones. Refer to the module fault-finding flow charts which show the signal flow through the module. When a point is reached where the signal is not present, or is distorted, the probable faulty component is indicated, which may then be checked and if necessary replaced. Integrated circuits, due to their internal complexity, are the most likely cause of problems, followed by mechanical components such as switches and faders, which are susceptible to physical contamination from oxidisation, dust, and liquids.

5.02 Removing Modules.

Due to the use of flat ribbon cables to provide the majority of interconnections between modules, removal of a module from the console must be preceded by unplugging the main 40 way ribbon cable from the module.

This is done by hinging down the underside of the console, by rotating the half-turn locking devices on the underside, using a coin or a screwdriver. The ribbon cable will now be exposed, and may be detached from the module.

Removal of the 2 module retaining screws, through the module front panel, will allow the module to be carefully withdrawn from the console. The module will still have some cables attached, but these are sufficiently long to allow the module to be completely withdrawn from the console.

The extender cables may now be plugged into the main ribbon cable, and the module, taking care not to twist the extender cable. Although damage to the module will not be caused by plugging and unplugging the module with the power still switched on, this is not recommended for the inexperienced, as it is possible to bend the connector pins if care is not taken.

5.03 Removing Patch Cards.

The entire patch bay is made up of individual rows of plug in patch cards, constructed with printed circuit mounting jack sockets. Each row can be easily removed from the assembly, to allow cleaning and replacement, should this ever prove to be necessary.

Remove the 4 patch bay retaining screws, located at the corners of the patch bay. This will allow the entire assembly to be lifted up and tilted to one side. Take care to avoid scratching the paintwork.

Locate the patch card which is to be removed, and unplug the ribbon cables connected to it, and if necessary, to the adjacent cards.

Remove the 2 screws holding the patch card to the panel, and, withdraw the card from the patch bay assembly.

Each individual jack socket has a dust cover, which can be unclipped to provide access to the jack contacts, for cleaning or adjustment pruposes.

Reassembly of the patch bay is the reverse of the above procedure.

5.04 Meter Alignment.

Each V.U. meter has its own individual drive card attached to the rear of the meter. This card also contains the detection and drive circuitry for the peak indicator LED, which is pre-set to indicate a peak level of 8dB above O.V.U.

O.V.U. is normally adjusted to indicate a line level of +4dBv, i.e. 1.228V. However, it may be adjusted to indicate a different line level, if required, by adjustment of the pre-set potentiometer on the drive card.

To align the meter drive, connect a millivoltmeter to a group output of the console. Route the oscillator, set to approximately 1 kHz, to the group and adjust the level to the millivoltmeter. (Normally, this would be +4dBv). Adjust the V.U. drive card preset to indicate O.V.U. and repeat for all other groups, and the Stereo Mix outputs.

Note that the peak LED will always illuminate at 8dB above whatever the O.V.U. level has been set to.

5.05 Meter Lamp Replacement.

Ilumination of the V.U. Meters is provided by 2 wire ended lamps in each meter. These are 9 volt lamps, wired in parallel. The lamps in each group of 4 meters are wired in series, and powered by connection across the ± 17 volt supply rails. A thermister and series resistor provide turn on surge current limiting, to increase the lamp life.

The stereo mix meters have an additional series resistor to stimulate the voltage drop of the missing pair of meters.

To replace the lamps first remove the front cover of the V.U. meter. This is done by applying pressure to the underside of the meter cover, and pulling the top of the cover forward. The 2 lamps will now be exposed to view, and can be unsoldered and replaced.

It is usually preferable to replace both lamps, even if only one has failed, as the remaining lamp will have been overstressed, and its life substantially reduced.

5.06 Power Supply Servicing

The Series 1624 power supply provides the following regulated supply rails:

a) ± 17 volts, Audio

b) ± 7.5 volts, Logic

c) ± 48 volts, Phantom Power

If a power supply fault is suspected, first ensure that it really is the P.S.U. which is at fault, and not a short circuit in the console. This can be checked by disconnecting the P.S.U. from the console, and measuring the voltage at the connector. A load across the supply should be provided, to simulate the normal load conditions imposed by the console.

A 10ohm, 20 watt resistor across each of the audio supply rails and a 20ohm 5 watt resistor across each of the logic supply rails is suitable. The phantom power supply can be loaded with a 2.2kohm, 1 watt resistor.

The ripple and noise value of the various supply rails can now be measured, using a millivoltmeter or an oscilloscope, and a value of at least -80dB (ref 0.775v, DIN Audio should be obtained on the audio and the phantom supply rails.

If a fault is found to exist in the P.S.U., disconnect the mains supply and remove the cover. Check visually for any obvious problems, such as blown fuse, burnt components, etc. If nothing obvious is

observed, reconnect the mains, and measure the voltages across the various electrolytic smoothing capacitors, which should be as follows:

Audio Supply	C2	=
	C3	=
Logic Supply	C4	=
	C5	=
Phantom Supply	C1	=

Differences of ± 10% are acceptable, due to variations in the incoming mains voltage. If satisfactory, the problem lies in the regulator section. If not however, check the bridge rectifier, smoothing capacitor, and transformer for failure.

Audio Supply

Theory of Operation (Numbers in brackets refer to negative regulator)

The bipolar audio supply is a dual, tracking regulator, with over-voltage and overcurrent protection, capable of supplying up to 5 Amps at ± 17 volts.

The amount of current drawn is sensed by the voltage drop across the parallel resistors, R13, R14, R14 for the positive rail, and R17, R18, R19 for the negative rail. As the current drawn increases to cause a voltage drop approaching 0.6 volt, TR20 (TR21) will begin to turn on, which in turn, will turn on TR17 (TR19). This will starve TR3, TR4 (TR7, TR8) of base current, from the current source, TR5 (TR6) and therefore start to turn TR1, TR2, (TR9, TR10) the main pass transistors off, thereby reducing the output voltage.

Output voltage regulation is by means of TR11, and TR12. (TR15, TR13). TR12 (TR15) compares the voltage across Zener diode D5 (D6) with the voltage across the output, via the potential divider R26, R22 (R25, R23), and attempts to keep them equal. For example, if the output voltage start to rise, the voltage at the base of TR12 (TR13) will start to exceed the emitter voltage set by the Zener diode, and the transistor will start to turn on. This will turn TR11 (TR15) on which will starve TR3, TR4 (TR7, TR8) of current, and therefore reduce the output voltage accordingly.

The positive and negative regulators are made to track each other by means of the cross connection diode D7, and TR16 (TR18). Under normal circumstances, when both output voltages are equal, the base of TR16 (TR18) will be approximately at the mid point of the supply rails, i.e. at 0 Volts $\pm$ the diode voltage drop. However, if for example the negative supply should start to fall, the mid point voltage will now move positive with respect to the OV rail, and will start to turn TR16 on. This will starve TR3, TR4 of current and therefore reduce the positive supply voltage to regain equilibrium between the supplies.

Servicing

As the bipolar audio supply is arranged as a tracking regulator, a fault on one half of the supply will usually affect the other half in the same manner. The tracking facility can be disabled

for test purposes by removing diode D7. (See schematic ED2072).

All transistors and diodes should be checked for normal operation, and replaced if necessary. Bear in mind that a failure of one semiconductor will often cause the failure of other associated components. The power transistors mounted on the heatsink should be checked individually as they are connected in parallel.

Logic Supply

The logic supply is extremely simple, comprising of 2 Monolithic regulator integrated circuits. A 5 Volt positive regulator, type 7805, is configured to provide 7.5 Volts, by means of the potential divider R39 and R41, raising the potential at the common terminal.

The negative supply is similar, except for the use of a 7905 regulator. In this case the potential divider is formed by R40 and R42.

Phantom Supply

The phantom supply allows up to 100 m.a. at 48 Volts to be drawn. It is very similar in operation to the audio supply.

TR24 compares the Zener diode voltage with the output voltage, via the potential divider formed by R33 and R34, and attempts to keep them equal. If the output voltage starts to increase, TR24 will begin to turn on, and will therefore progressively starve the pass transistor TR23 of base current, from the constant current source TR22. TR23 will then begin to turn off, and therefore reduce the output voltage.

Current is sensed by the voltage dropped across R35. As this voltage approaches 0.6 Volt, TR25 will start to turn on, and therefore turn off TR23, until the voltages at TR24 are once again the same.

5.07 Module Current Consumption

In certain cases, a module malfunction can be located by measurement of the current consumption of that module. This is most easily accomplished by measuring the voltage drop across the module supply decoupling resistors, and using Ohms Low to calculate the current. $I = \frac{E}{R}$, where I is in Amps, E is in Volts, and R is in Ohms.

The following figures are typical, but may be $\pm$ 10% due to normal circuit tolerances. In all cases, the current should be approximately equal for the positive and negative rails.

a) Input Module

Main board	1C1 to 1C7	25 m.a.
	1C8	3.4 m.a.
Switch Board	1C1	1.8 m.a.

b) Group/Monitor Module 27 m.a.

c) Master Module

Monitor Board		33 m.a.
Auxiliary Board	1C1 to 1C12	61 m.a.
	1C 13, 1C 14	5 m.a.

6.00 DESCRIPTION S1624 SPR (CUST) RZ 2212

COMPONENT ITEM NO.	DESCRIPTION	QUANTITY	
BB0106	ZENER DIODE 400MW 11V	2.000	EA
BC0202	BRIDGE RECT 18DB1/A	2.000	EA
BC0205	BRIDGE RECT 150V 18A RS261-659	2.000	EA
BD0301	PNP TRANSISTOR 2SA842GR	5.000	EA
BD0302	NPN TRANSISTOR 2SC1681BL	2.000	EA
BD0303	PNP TRANSISTOR BC143	2.000	EA
BD0306	NPN MED PWR TRANSISTOR BC300	2.000	EA
BD0309	PNP PWR TRANSISTOR MJ2955	2.000	EA
BD0310	NPN PWR TRANSISTOR 2N3055H	2.000	EA
BD0312	PNP TRANSISTOR PN4355	12.000	EA
BE0404	SGL BI-FET OP AMP IC TL071CP	3.000	EA
BE0407	SGL OP AMP IC NE5534	3.000	EA
BE0413	DUAL BI-FET OP AMP IC TL072CP	3.000	EA
BE0424	5V 1A+ VOLT REG LM7805	2.000	EA
BE0425	5V 1A- VOLT REG LM7905	2.000	EA
BF0502	QUAD 2 I/P NAND GT CD4011BE	10.000	EA
BF0505	QUAD SWITCH CD4016BE	3.000	EA
DA0001	PREH S/SP C/D+BRKT 4K7LINX2	4.000	EA
DA0002	PREH S/SP 41P/D 10K+LOG	4.000	EA
DA0003	PREH S/SP 41P/D 10K+LOG X2	2.000	EA
DA0004	PREH S/SP 41P/D+BRKT 10K-IL	2.000	EA
DA0005	PREH S/SP C/D 47K LIN	4.000	EA
DA0006	PREH S/SP 41P/D 100K- X2	4.000	EA
DD0301	RUWIDO MONO FDR 10K LOG	2.000	EA
DD0309	P&G 105MM MONO 1120/D D21797/1	1.000	EA
DD0310	P&G 105MM STER 1122/D D21798/1	1.000	EA
DF0503	SCHADOW 2 POLE PUSH SWITCH	4.000	EA
DF0504	SCHADOW 4 POLE PUSH SWITCH	2.000	EA
DF0511	D6 KEY SWITCH (L+I)	2.000	EA
DJ0801	MARQUARDT TAP CHANGE	1.000	EA
HB0114	S1624 MAINS TX TR7023	1.000	EA
JA0001	TOSHIBA MINI LED GREEN TLG102	4.000	EA
JA0002	TOSHIBA MINI LED RED TLR102	4.000	EA
JA0003	TOSHIBA LED·RED TLR104	4.000	EA
JB0102	INDICATOR 14V MA/68 RED	2.000	EA
JB0104	INDICATOR 14V MA/68 GREEN	2.000	EA
JB0105	INDICATOR 14V MA/68 AMBER	2.000	EA
JB0114	BULB FOR R55 VU MTR 9V	20.000	EA
JD0310	SIS/S1624 VU MTR R55	2.000	EA
JD0312	S1624 VU MTR R45 16/16 ONLY	2.000	EA
KA0002	11MM/LINE 4MM PUSH ON BRN KNOB	5.000	EA
KA0013	P&G FDR KNOB 15MM WIDTH YELLOW	1.000	EA
KA0015	P&G FDR KNOB 15MM WIDTH RED	2.000	EA
KA0018	RUWIDO FDR KNOB GREY	2.000	EA

DESCRIPTION S1624 SPR (CUST) RZ 2212 (Cont)

COMPONENT ITEM NO.	DESCRIPTION	QUANTITY	
KA0020	P&G FDR KNOB 15MM WIDTH WHITE	2.000	EA
KC0206	CAP C110 BLACK	2.000	EA
KC0207	CAP C110 BLUE	2.000	EA
KC0208	CAP C110 GREEN	2.000	EA
KC0210	CAP C110 ORANGE	2.000	EA
KC0211	CAP C110 RED	2.000	EA
KC0212	CAP C110 YELLOW	2.000	EA
KC0220	D6 SNAP CAP GREEN	2.000	EA
KC0221	D6 SNAP CAP RED	2.000	EA
KC0223	D6 SNAP CAP GREY	2.000	EA
ZB0107	EAGLE MIC CAP C1200	1.000	EA
ZD0305	3.15A 20MM ANTI-SURGE FUSE	2.000	EA
ZD0308	20MM FUSEHOLDER (BULGIN)	2.000	EA