

## Tips about Studio and Control Room Wiring For Community Radio Stations

The following article is created as an aide to Community Radio Stations and will hopefully be of help to establish sound and consistent wiring practices

The article is divided into several sections with each section dealing with a particular subject

- 1; Power Wiring**
- 2; Systems Grounding**
- 3; Audio Cabling, Audio Levels and Colour Codes**
- 4; Cable Distribution**
- 5; Main Distribution Frame in Control Room**
- 6; Racks**
- 7; KRONE Terminals**
- 8; Jack Fields**
- 9; Cable Documentation**

### **1; Power Wiring**

All work involving AC Mains Light and Power Wiring, including minor changes or additions must be carried out by a Licensed Electrical Contractor

In order to keep Electrical Noise and Interference generated by Appliances, Light Dimmers etc out of Broadcast Equipment, it is highly advisable to keep Power Wiring connected to such equipment completely separate from General Power and Light Wiring

All Technical Equipment associated with Broadcasting such as Control Room, On-Air Studio-1, On-Air Studio-2, News Room, Production Room, Recording Studio, On-Air Digital Audio Delivery Computers, associated File Servers, Studio to Transmitter Link Transmitter etc should all feed from a common Technical Power AC Mains Power source

Generally, power demand by modern Broadcast Studio Equipment is fairly modest, so for simplicity and economy, Single Phase Power will suffice

#### **See Attachment 1**

**Drawing SW-1** show a basic Power Distribution System consisting of a Sub Distribution Power Board fed from the main Electric Switchboard in the building

This should be located near the Racks in the Control Room and provide AC Power Feeds to each Technical Area

Each Power Feed should be protected by an Earth Leakage Breaker, and should ideally take the same route as the Audio Wiring, but must in order to prevent interference be separated from the Audio Wiring by 500mm or more

**Drawing SW-2** show the same arrangement with Standby or Emergency Power Provided

Power Management can be an elaborate system providing Automatic Emergency Diesel Engine Start and Power Changeover, or a simple Manual Changeover Switch, and Manual Emergency Generator Starting

The drawing shows an Uninterruptible Power Supply (UPS) for Computers and File Servers associated with actual Broadcasting

## **2; Systems Grounding**

A solid Technical Earth or Ground System is also important to prevent Earth Loop and to keep Electrical Noise and Interference to a minimum

**See Attachment 1**

**Drawing SW-3** show Earth Stakes connected to the Common Ground or Earth Bus in the Sub Distribution Box

**Drawing SW-4** Show an additional Mains Interference Filter connected into the power feed to the Sub Distribution Box

A Mains Filter is highly beneficial on noisy AC Power Lines, and can reduce mains borne interference such as Clicks and Pops caused by Thermostats, and Motors Starting and Stopping by a considerable amount

The Earth or Ground System can be strengthened by running an additional heavy earth wire in parallel with the AC Mains cables between the Control Room and the various Technical Areas

## **3; Audio Cabling, Audio Levels and Colour Codes**

All truly Professional Audio Wiring and Cabling is executed as Balanced Line Wiring and is operated at low or known Impedances and at Standard Audio Levels

Unfortunately, for economical or other reasons, some Unbalanced Line Domestic or Consumer Equipment is also used in the Broadcast Chain by many Radio Stations

Line Impedances and Line Levels associated with such equipment are not fully standardized, and vary greatly between different pieces of equipment

**Broadcast Level Balanced Lines with Microphones discussed later in this**

**Balanced Line Advantages;** Identical Audio Level used by all Professional Equipment sold in Australia, High Immunity to Hum Loops, Crosstalk and Induced Noise, Able to feed into very Long Cables without serious Quality Deterioration

**Balanced Line Disadvantages;** More expensive to execute than Unbalanced Lines, Usually use fairly expensive Connectors

**Unbalanced Line Advantages;** Inexpensive to execute, Usually use Low-Cost Connectors

**Unbalanced Line Disadvantages;** Audio Level not Standardized, varies from 100 mV to 1 Volt, Prone to Hum Loops, Crosstalk and Induced Noise, Unable to feed into Cables more than 2 Meters long without serious High Frequency Loss

### **Microphones**

Professional Microphones are always wired as a piece of Balanced Line Equipment with a common Quoted Source Impedance of 200 Ohms and designed to feed into a High Impedance also known as a Bridging Load

Low Cost Domestic Quality Microphones such as those for use with Cassette Decks or Computer Sound Cards are High Impedance Unbalanced, and completely useless for Broadcast Applications

## **Audio Cabling**

**For Microphones**

Always use the Best Quality Twin Conductor (Balanced) Screened Microphone Cable you can afford

Cannon XLR type Connectors are suitable for use with Microphones, never use 1/4" Stereo Jacks, also never take Microphone Circuits through Jackfields or KRONE Terminals

### **For Unbalanced Lines**

Use Good Quality Standard Leads with Moulded Connectors, Cheap and readily available from any Electronics Hobby Store, Keep the cables short, Discard Connectors at unused end if necessary

See attachment 2 Drawing SW-1 for connection to Elan Audio Mixers

### **For Mixer to Headphone Outlet**

Use any Reasonable Quality Twin Conductor Screened Cable, or CAT-5 Computer Network Cable

See attachment 2 Drawing SW-7 and 8 for connection to Elan Audio Mixers

### **For Balanced Broadcast Level Lines**

Many Choices available, Screening is not necessary in majority of applications

CAT-5 Computer Network Cable is quite suitable in many cases, (Compatible with Krone Terminals)

10 Pair Indoor Telephone Cable, Screened or Unscreened, (Compatible with Krone Terminals)

Both CAT-5 Cable, and 10 Pair Indoor Telephone Cable are constructed with (Twisted Pairs) for noise and crosstalk immunity, both types are suitable for Control Wiring

10 Pair Indoor Telephone Cable, is particularly suitable for use as interconnecting cables between the (MDF) Main Distribution Frame in the Control Room and the Studios

### **See Attachment 2**

**Drawing SW-5 A** Show Unbalanced Stereo from Hi-Fi Equipment, most likely via RCA Connectors

**Drawing SW-5 B** Show Unbalanced Stereo from a 1/4" or 3.5mm Jack Plug

**Drawing SW-5 C** Show Unbalanced Mono from a Jack Plug

**Drawing SW-6 A** Show Balanced Stereo via two Twin Screened Cables

**Drawing SW-6 B** Show Balanced Mono via Twin Screened Cable

**Drawing SW-6 C** Show Balanced Stereo via CAT-5 Cable

**Drawing SW-7 A** Show Falcon and Hawk Headphone Wiring for 1 Guest

**Drawing SW-7 B** Show Falcon and Hawk Headphone Wiring for 2 Guests

**Drawing SW-8 A** Show Announcer and Guest Headphone Wiring for Kestrel Mixer

**Drawing SW-8 B** Show Kestrel Mixer Headphone Wiring for 2 Guests

**Drawing SW-9 A** Show a simple adapter system to connect various types of Unbalanced Equipment

**Drawing SW-9 B** Show the same adapter connected via an UUB-01 Module (Better but more costly)

## **Audio Levels**

### **Microphones**

Accepted Standard Audio Level from a Balanced Line Microphone is for Measurement Purposes – 60 dBV, or 1 milliVolt being the level produced by a Dynamic Microphone such as the AKG D 770II when spoken into with a normal voice at a distance of about 200 mm

In reality Microphone Levels varies widely, depending on Type and Make of Microphone, and how it is used

Condenser Microphones have been known to produce audio levels as high as -20 dBV or 100 mV when shouted into

Microphone Input Gain on all Elan Audio On-Air Mixers is adjustable and designed to accept and handle any likely encountered Microphone Levels

### **Unbalanced Lines**

Line Levels are not standardised, and varies from about 100 mV to 1 V depending on the type and model of Domestic Equipment used

All Elan Audio On-Air Mixers have internal adjustments available, and will adjust to accept levels of 300 mV and up

As mentioned earlier in this, output impedance of most domestic equipment is fairly high, use of Single or Twin Screened Cable is Mandatory, but equipment will not tolerate long cables as they will cause High Frequency (Treble Loss) and a risk of Hum and other Interference

### **Balanced Broadcast Level Lines**

Balanced Line Audio Levels used in the Broadcast Industry, are with a few exceptions standardized in Australia as well as the majority of overseas countries except for Europe and the UK to + 4 dBu

Normal Industry Practise within the Studio Complex is for Line Amplifiers in equipment to have a Low Output or Source Impedance of around 50 Ohms, and for equipment Input Stages not to be terminated and present a High Impedance normally 10 to 50 K Ohms to line

Articles separate to this will discuss Line Levels, Line Termination and Audio Level Metering in detail

### **A bit more about Balanced Lines**

Balanced Line Technology combined with the Low Source Impedance of Line Amplifiers used in Professional Broadcast Equipment is, when correctly installed, virtually immune to Interference and Crosstalk, and does not normally need Shielding or Screening

10 Pair Indoor Telephone Cable, and CAT 5 Computer Network Cable is generally quite suitable for use in Fixed Installations

Both types are inexpensive, readily available, easy to work with, and fully compatible with KRONE Insulation Displacement Terminals

## **Colour Coding**

10 Pair Indoor Telephone Cables and CAT 5 Computer Network Cables are both constructed from a number of wires where individual groups of 2 wires are twisted together to form a Pair

The Twisted Pair construction is the "Real Secret" to the immunity to Interference and Crosstalk

Please take great care not to "Separate or Mix Up" the pairs during installation as the benefits of Balanced Line Technology will be lost

### **10 Pair Indoor Telephone Cable**

This is made up from 20 Plastic Insulated Solid Strand Wires, arranged as 10 Twisted Pairs

Each Pair consist of a White Wire and a Colour Coded Wire

The White Wire is called the MATE, and is the HOT or Positive wire in the pair

The Colour Coded Wire is called the WIRE, and is the COLD or Negative wire in the pair

Colour Coding for the standard 10 Pair Cable used by Telstra is as follows

1; Blue; BU 2; Orange; OR 3; Green; GN 4; Brown; BN 5; Slate; SL Mate; White; WH

|         |       |    |        |             |
|---------|-------|----|--------|-------------|
| Pair 1  | BU    | WH | Blue   |             |
| Pair 2  | OR    | WH | Orange |             |
| Pair 3  | GN    | WH | Green  |             |
| Pair 4  | BN    | WH | Brown  |             |
| Pair 5  | SL    | WH | Slate  |             |
| Pair 6  | BU/WH | WH | Blue   | White Trace |
| Pair 7  | OR/BU | WH | Orange | Blue Trace  |
| Pair 8  | GN/BU | WH | Green  | Blue Trace  |
| Pair 9  | BN/BU | WH | Brown  | Blue Trace  |
| Pair 10 | SL/BU | WH | Slate  | Blue Trace  |

### **CAT 5 Computer Network Cabling**

This is made up from 8 Plastic Insulated Solid Strand Wires, arranged as 4 Twisted Pairs

|        |    |       |        |        |             |
|--------|----|-------|--------|--------|-------------|
| Pair 1 | BU | BU/WH | Blue   | Blue   | White Trace |
| Pair 2 | OR | OR/WH | Orange | Orange | White Trace |
| Pair 3 | GN | GN/WH | Green  | Green  | White Trace |
| Pair 4 | BN | BN/WH | Brown  | Brown  | White Trace |

## **4; Cable Distribution**

There are many different ways and methods of cabling a Radio Station

Probably the neatest and best method is to install a number of 10 Pair Indoor Phone Cables between each Studio and Control Room and terminate these at both ends on KRONE Terminal Blocks

From past experience, you always need more cabling for additions etc than first envisaged, and as Indoor Phone Cable and KRONE Blocks are relatively inexpensive, add a couple of extra cable runs when doing the initial installation

Where possible, keep different types of circuits in separate cables

You have Programme Output Lines, Programme Input Lines, Monitor Circuits, Talkback Circuits, Control Circuits and etc

### **See Attachment 3 Drawing1**

Each area must be provided with an adequate number of Krone Terminal Blocks and connected via 10 Pair Indoor Telephone Cable to Krone Terminal Blocks located on the MDF in the Control Room

Wiring from the Mixer and other equipment can be done in various types of cable to suit

Cable used, **MUST** be a suitable type for termination to Krone Blocks

## **5; Main Distribution Frame in Control Room**

Good practise is to create an MDF in the Station Control Room, and terminate the cabling from all Studios, Incoming and Outgoing OB and other Lines the Racks and other Technical Facilities required for Broadcasting

All necessary interconnecting wiring required is then done using Telephone Type "Twisted Jumper Wire" making any future wiring changes and troubleshooting very simple and easy

### **See Attachment 3 Drawing-2**

The MDF can simply be a suitable Plywood or Particle Board panel mounted on the wall behind the racks with the Krone Blocks mounted on Krone Backmount of Profil Frames of suitable size

Wiring to external areas can be fed to the MDF from the top or bottom whatever is most convenient with wiring to the racks, best done from the bottom as illustrated on the following drawings



Series 2 Disconnect Module, Profil

6089 1 121-02

Backmount Modules mount on Backmount Frames only, and are suggested for Studio and other areas outside the Control Room

Profil Modules mount on Backmount Frames, and Profil "Swing Frames" suggested for use in the Control Room

Connecting Tool

6089 2 003-00

Essential Tool for connecting to Krone Terminal Blocks

Module Label Holder 2/10 with Label, Backmount

6092 2 012-02

Profil Label Holder

6462 2 094-00

Nice and not expensive addition to a quality installation

Jumper Ring Assembly

6037 2 007-00

Horizontal Jumper Guide

6460 3 027-00

Very practical accessory for tidy jumper wiring in Control Room

Backmount Frame 2 Way

6450 3 025-02

Backmount Frame 3 Way

6450 3 025-03

Backmount Frame 4 Way

6450 3 025-04

Backmount Frame 6 Way

6450 3 025-06

Backmount Frame 11 Way

6450 3 025-11

Best way to mount Krone Terminal Blocks in Studio and areas outside of Control Room

Jumperable Frame Profil 11 Way

6460 1 042-00

Jumperable Frame Profil 27 Way

6460 1 042-01

Our preferred mounting of Krone Terminal Blocks on Control Room MDF

19 Inch Backmount Frame, 9 Way Recessed

6450 2 009-00

19 Inch Backmount Frame, 15 Way Recessed

6450 2 006-00

A practical solution for mounting Krone Backmount Terminal Blocks in a Rack or Studio Desk

## See Attachment 5

**Drawing-1** shows the layout of a Krone Disconnect Terminal Block or Module

A Disconnect Module is provided with contact springs between top and bottom contact rows arranged to break or disconnect circuit between top and bottom rows by inserting a special disconnection plug

Two other types of special plug are available

Series 2 Plug Set, 2 Pole 6089 2 026-00 is suitable for monitoring across any wire pair

Series 2 Plug Set, 4 Pole 6418 2 401-00 is suitable for interception and insertion of audio to top and bottom rows and act in the same manner as a very basic jackfield

A test module with cords 6037 2 011-01 is also available, see Krone Catalogue for more details

Only significant difference between the Series 2 Disconnect Module, Backmount type 6089 1 102-02 and the Series 2 Disconnect Module, Profil type 6089 1 121-02 is the mounting method

Here are a few General Rules for use of Krone Blocks in Broadcast Installations

1; Never use for Microphone or Unbalanced Circuits

- 2; Never Terminate more than 2 wires into a Terminating Slot
- 3; Always use cable compatible with Krone Blocks
- 4; Always install Main or Trunk Cables first
- 5; Route Main or Trunk Cabling under or to left of Krone Blocks when using Backmounts
- 6; Route Main or Trunk Cabling to the left of Krone Blocks when using Profil System
- 7; White Wire (Mate) to left slot, Coloured Wire (Wire) to right slot
- 8; White Wire (Mate) is Hot or Plus, Coloured Wire (Wire) is Cold or Minus
- 9; Always Terminate Main or Trunk Cables to Top Row
- 10; Always Connect Jumper Wires to Bottom Row
- 11; Always keep Jumper Wires to the left of the Krone Blocks
- 12; Always route Jumper Wires to the top of MDF and back down again

**Drawing-2** shows more detail of Krone Block

**Drawing-3** shows how Krone Block MDF systems number from bottom

## 8; Jack Fields

Jack Fields or Patch Bays are expensive to purchase, and very Time Consuming to install

Despite this, they are also a very valuable facility for use in trouble shooting, and allows you to By-Pass a faulty piece of equipment in an emergency situation or for maintenance, and should be considered, or at least planned for in the Main Programme Path

Only the Post Office Type ¼" Long Frame Jacks should be considered for broadcast use

"Bantam" Jacks as used in Recording Studios, and normal ¼" Stereo Hi Fi Jacks are not suitable

**Warning;** Plugging a ¼" Stereo Hi-Fi Jack Plug into a Long Frame Jack socket will damage the Contact Springs inside the Jack Socket

**Please Note:** Jack Sockets are normally fed from the top as indicated by the arrows

**See Attachment 6,** showing several different methods of wiring Jacks, a typical Jack Field Arrangement, and how this could be applied in a Radio Broadcast Station

**Drawing-1 A** shows Double Normalized Jacks with a Single Bridging Jack as a Monitor Point, isolated by protective resistors

This was the normal arrangement used in the past, allowing monitoring across the line without significantly loading it when using the "Old Fashioned S G Brown" 2000 Ohm Headphones AKA "Cans"

**Drawing-1 B** shows Double Normalized Jacks, note that the internal contacts are wired to break the circuit when a Jack Plug is inserted in either socket making monitoring across a line difficult

Wiring arranged as Double Normalizing is not generally used in modern systems

**Drawing-1 C** shows Half Normalized Jacks, and is the most popular method of wiring Jackfields

Top Socket is wired across the incoming line allowing the use of a High Impedance Monitor System such as one of the Monitor Inputs on the Elan Audio RDS-01 Delegation Switcher

Low Impedance Hi-Fi Stereo Headphones should never be used as they will load the line

Bottom Socket is wired to break the circuit feed from the Top Socket allowing audio from another source to be fed to the line

**Drawing-1 D** shows Single Bridging Jacks

These can be arranged to be Inlets, Outlets or Both Way Jack Sockets

Inlet Sockets, could be the Input to an Audio Distribution Amplifier or Monitor System etc

Outlet Sockets, could be the Outputs from an Audio Distribution Amplifier, Tone Generator etc

Both Way Sockets, could be circuits used in either direction such as OB Lines, Tie Lines etc

**Drawing-1 E** shows 4 Single Bridging Jacks wired in parallel and is a practical way of splitting a Mono Line Feed two ways into Stereo Lines as is sometimes required for Mono OB's

Splitting will give equal audio feed into Left and Right Channels, but **Will Not Produce Stereo**

**Never** Combine Stereo Lines to produce Mono by using Parallel Jacks

**Drawing-2** shows an example of a "Fictitious" Jackfield

**Drawing-3** shows this Jackfield applied in a typical, also "Fictitious" Radio Station Installation

The 4 Sources normally producing Program to Air are Studio-1, Studio-2, Automation and a Satellite Receiver

Outputs from these are wired to Krone Blocks in the Control Room MDF, Jumpered to other Krone Blocks and from there wired to the Jackfield in the Control Room Rack, and from there wired on to Program Inputs 1 to 4 of the Delegation Switcher

Program Output-1 of the Delegation Switcher is wired to the Input of the Audio Processor via the Jackfield, and on to the Stereo Generator, also via the Jackfield

Output of the Stereo Generator is Composite Stereo and fed directly to the STL Transmitter

Composite Stereo is Unbalanced and cannot be fed through the Jackfield

Program Output-2 of the Delegation Switcher is wired to an Audio Distribution Amplifier via the Jackfield

Some of the DA Outputs appear on Single Bridging Jacks for general use such as feeding to OB Lines or Recorders etc

The Recording Studio is fed to Monitor Input-7 of the Delegation Switcher allowing monitoring of this in the Control Room at any time

To feed the Recording Studio to Air, simply Jack from Recording Studio Out (Top Jacks) to Delegation Switcher Input 4 (Bottom Jacks) and switch Input 4 to line

To feed Studio-1 to Air By-Passing the Delegation Switcher, simply Jack from Studio-1 Out (Top Jacks) to Audio Processor In (Bottom Jacks)

Studio Tie Lines 1 and 2 are general purpose Bi-Directional lines connecting from Control Room to each Studio and other areas where they may be useful

The Off-Air Monitor Receiver, preferably the Elan Audio RMR-01 feeds Monitor Input-8 of the Delegation Switcher via Half Normalized Jacks

**Drawing-4** shows a typical arrangement of Inter Studio Tie-Lines

**Drawing-5** shows a typical arrangement of OB Lines protected by Line Isolating Transformers

Austel approved, full Broadcast Specification Line Isolating Transformers, or Line Isolating Units are mandatory on all Incoming and Outgoing Leased Land Lines

## **9; Cable Documentation**

Careful planning of a Broadcast Station Installation is very important

Accurate Documentation and Records of all cabling down to the last wire is time consuming, but **Absolutely Essential**

Just as important as the original documentation and records, is the task of updating the records immediately changes are made and never rely on memory

Nothing is more frustrating or time wasting to a technical person, than a messy installation with no records, or worse incomplete or inaccurate records

Attached with this are suggested Installation Records Sheets which you may freely copy or modify to suit your particular needs

**Attachment 7** shows the basis for a Jackfield Record Sheet

**Attachment 8** shows the basis for a Krone Terminal Records Sheet

**Attachment 9** shows an example of a Fictitious Jackfield

**Attachment 10** shows a typical example of Krone Terminal Wiring in the Control Room between Studio-1 and Control Room assuming a Hawk-12 Mixer

Trunk Wiring is best done in 10 Pair Indoor Telephone Cable

In the Control Room, Trunk Wiring goes to Top Terminals, Jumpers to Bottom Terminals

In the Studio, Trunk Wiring goes to Top Terminals, Mixer and other Equipment to Bottom Terminals

KT-??? Studio-1/1      Main Outputs

|      |                            |
|------|----------------------------|
| 1-A  | Program Output Left        |
| 1-B  | Program Output Left        |
| 2-A  | Program Output Right       |
| 2-B  | Program Output Right       |
| 3-A  | SPARE                      |
| 3-B  | SPARE                      |
| 4-A  | SPARE                      |
| 4-B  | SPARE                      |
| 5-A  | SPARE                      |
| 5-B  | SPARE                      |
| 6-A  | SPARE                      |
| 6-B  | SPARE                      |
| 7-A  | Off-Air Monitor In Left    |
| 7-B  | Off-Air Monitor In Left    |
| 8-A  | Off-Air Monitor In Right   |
| 8-B  | Off-Air Monitor In Right   |
| 9-A  | Extension Monitor In Left  |
| 9-B  | Extension Monitor In Left  |
| 10-A | Extension Monitor In Right |
| 10-B | Extension Monitor In Right |

KT-??? Studio-1/2      Talkback and Aux In

|     |                |
|-----|----------------|
| 1-A | Talkback-1 Out |
| 1-B | Talkback-1 Out |
| 2-A | Talkback-2 Out |
| 2-B | Talkback-2 Out |
| 3-A | Talkback-3 Out |
| 3-B | Talkback-3 Out |
| 4-A | Talkback-4 Out |
| 4-B | Talkback-4 Out |
| 5-A | Talkback-5 Out |
| 5-B | Talkback-5 Out |
| 6-A | Talkback PTT   |
| 6-B | Talkback PTT   |
| 7-A | Talkback In    |
| 7-B | Talkback In    |
| 8-A | Aux In         |
| 8-B | Aux In         |
| 9-A | SPARE          |

9-B SPARE  
10-A SPARE  
10-B SPARE  
KT-??? Studio-1/3 High Level Inputs

1-A HL-1 In Left  
1-B HL-1 In Left  
2-A HL-1 In Right  
2-B HL-1 In Right  
3-A HL-2 In Left  
3-B HL-2 In Left  
4-A HL-2 In Right  
4-B HL-2 In Right  
5-A HL-3 In Left  
5-B HL-3 In Left  
6-A HL-3 In Right  
6-B HL-3 In Right  
7-A HL-4 In Left  
7-B HL-4 In Left  
8-A HL-4 In Right  
8-B HL-4 In Right  
9-A HL-5 In Left  
9-B HL-5 In Left  
10-A HL-5 In Right  
10-B HL-5 In Right

KT-??? Studio-1/4 Miscellaneous and Control

1-A  
1-B  
2-A  
2-B  
3-A  
3-B  
4-A  
4-B  
5-A  
5-B  
6-A  
6-B  
7-A  
7-B  
8-A  
8-B  
9-A  
9-B  
10-A  
10-B

In our experience, no two Radio Stations are ever alike with the examples shown on Attachments 9 and 10 intended only to illustrate the general principles of Studio Wiring

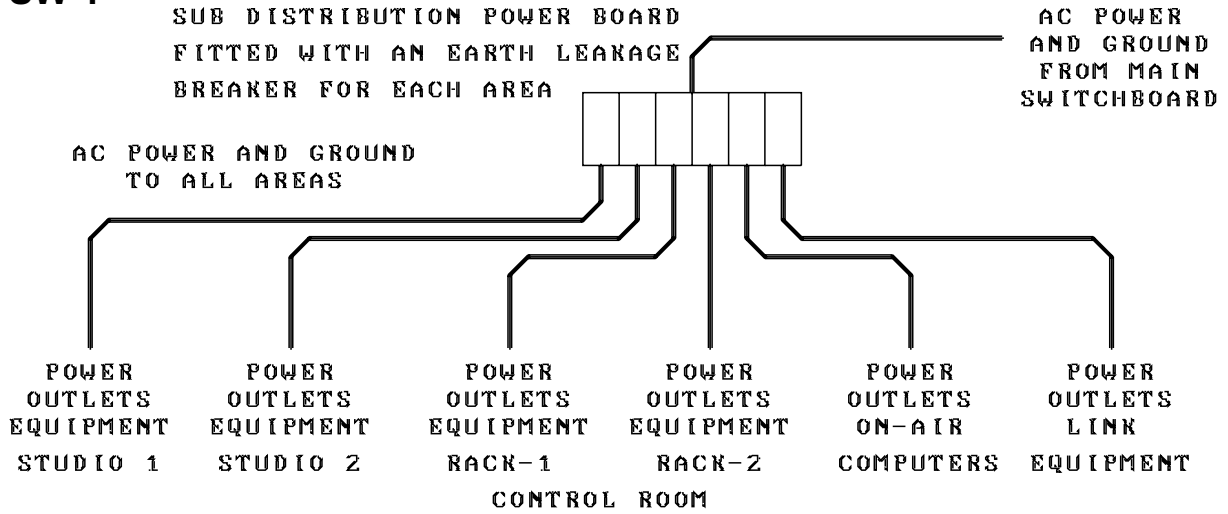
### **Cable Planning and Records Software**

An excellent solution for a Radio Station is to purchase a copy of "Term Data"  
"Term Data" is a special Software Package, designed to assist in Installation Planning, Documentation and Records Updating available from Radio Support Services for about \$ 500.00c

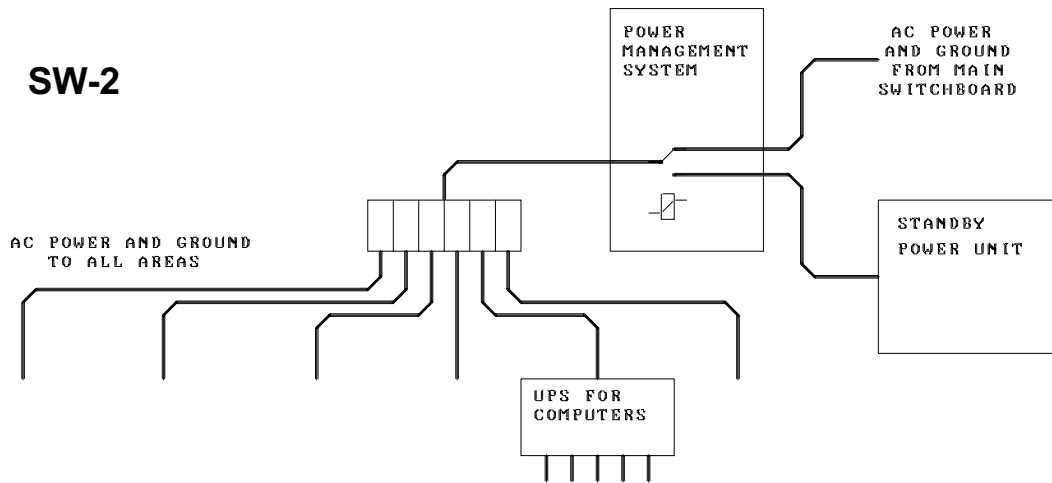
\$ 500.00c may seem a lot of money for a Community Radio Station to spend on something you can easily do with Pen and Paper, but "Term Data" is well worth considering

For details or to purchase "Term Data" Contact Richard Fleming, Radio Support Services Pty Ltd  
Phone 02 9457 8800, Fax 02 9457 0279, email [Richard@radiosupport.com](mailto:Richard@radiosupport.com) [www.radiosupport.com](http://www.radiosupport.com)

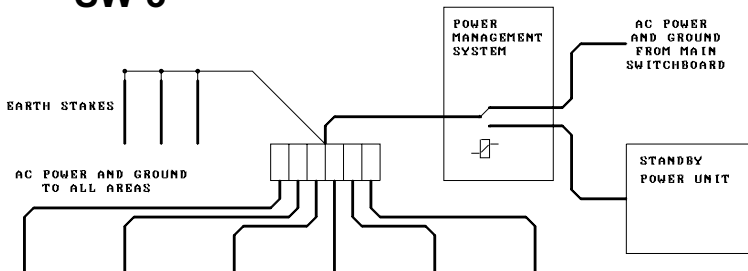
**SW-1**



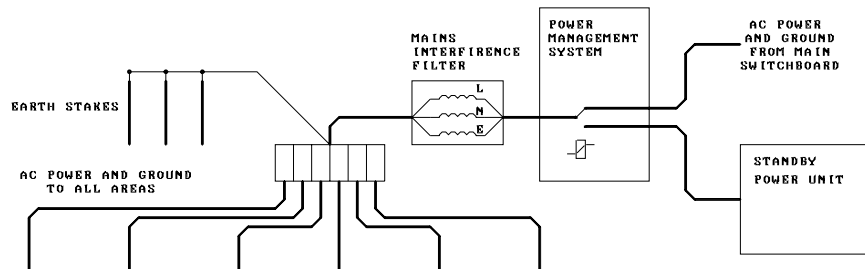
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**SW-3**

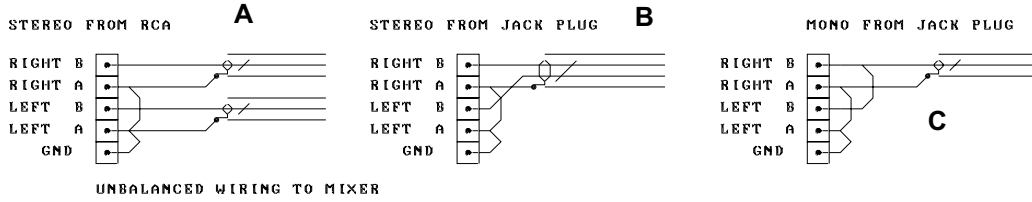


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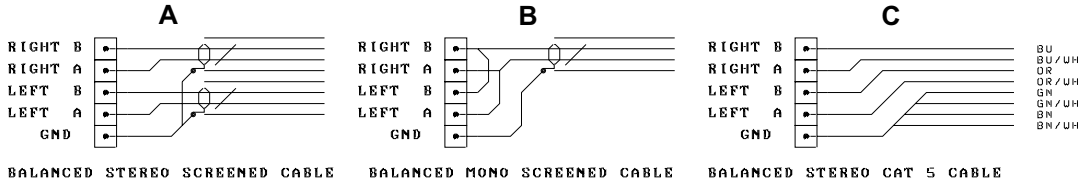


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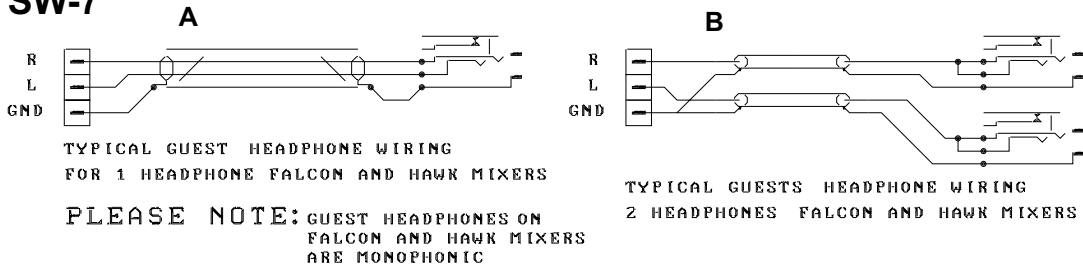
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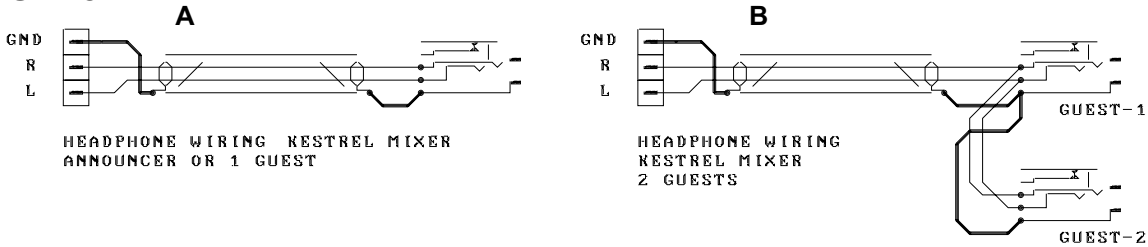
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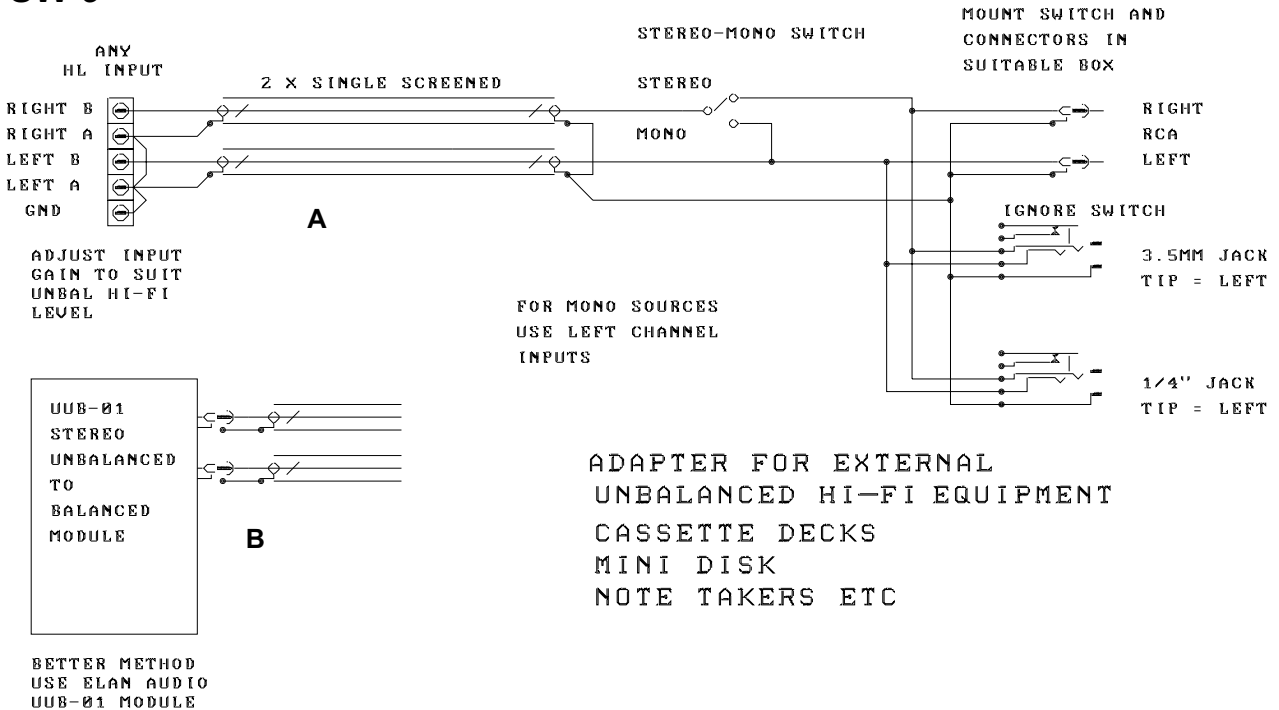
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**SW-8**

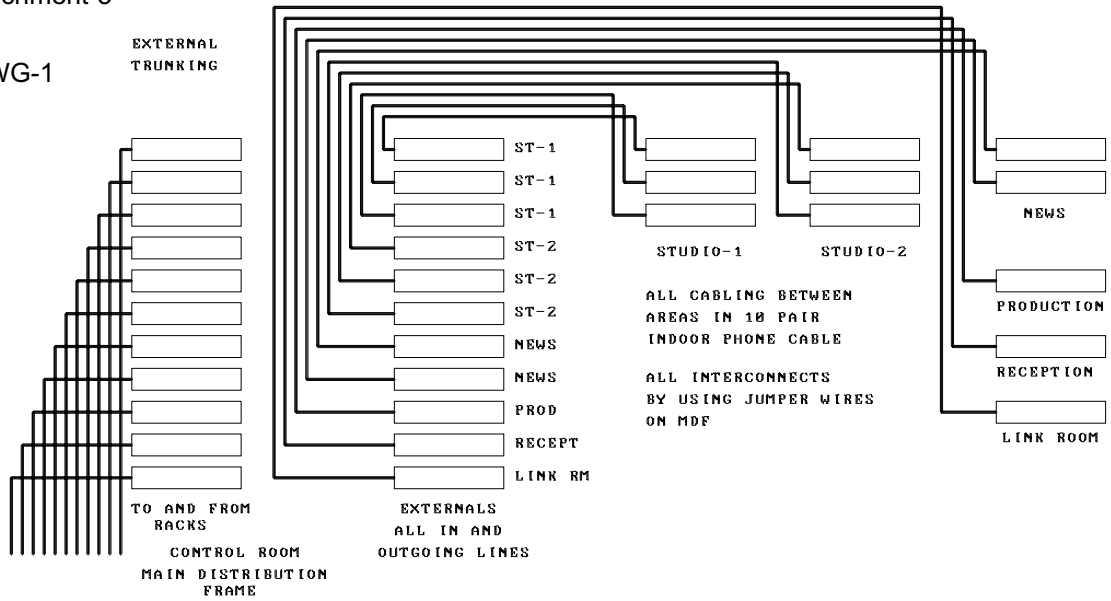


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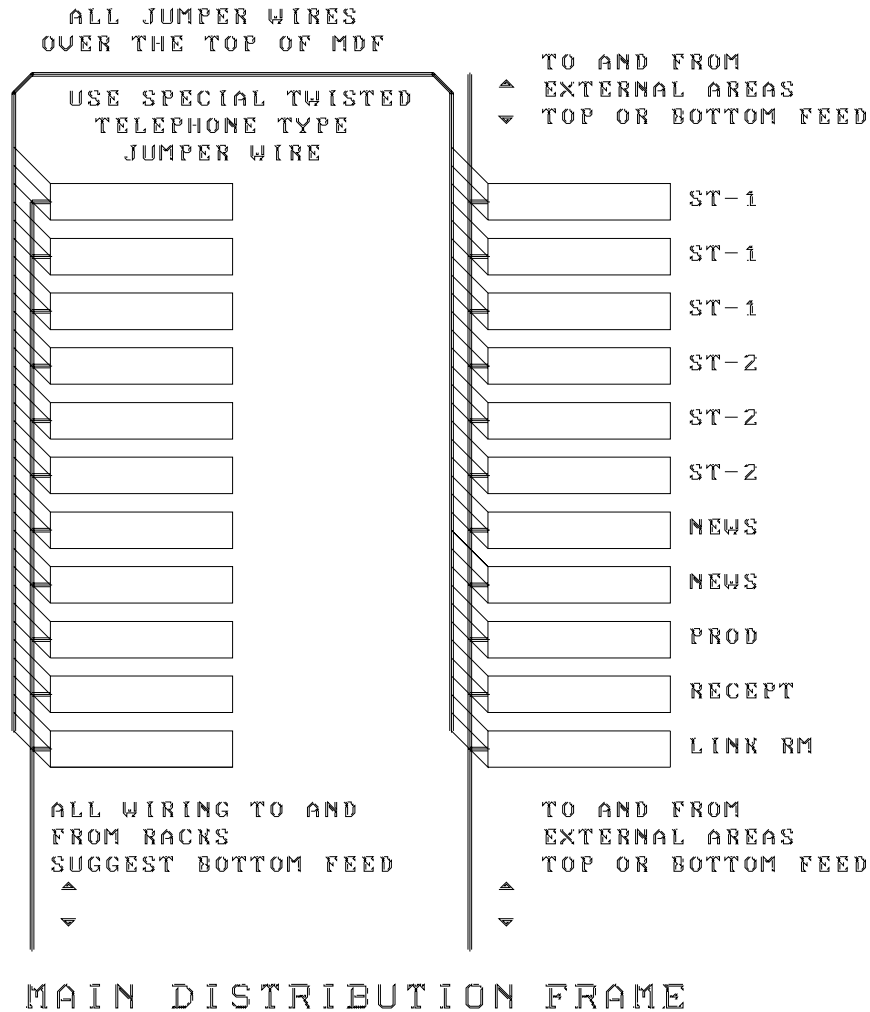


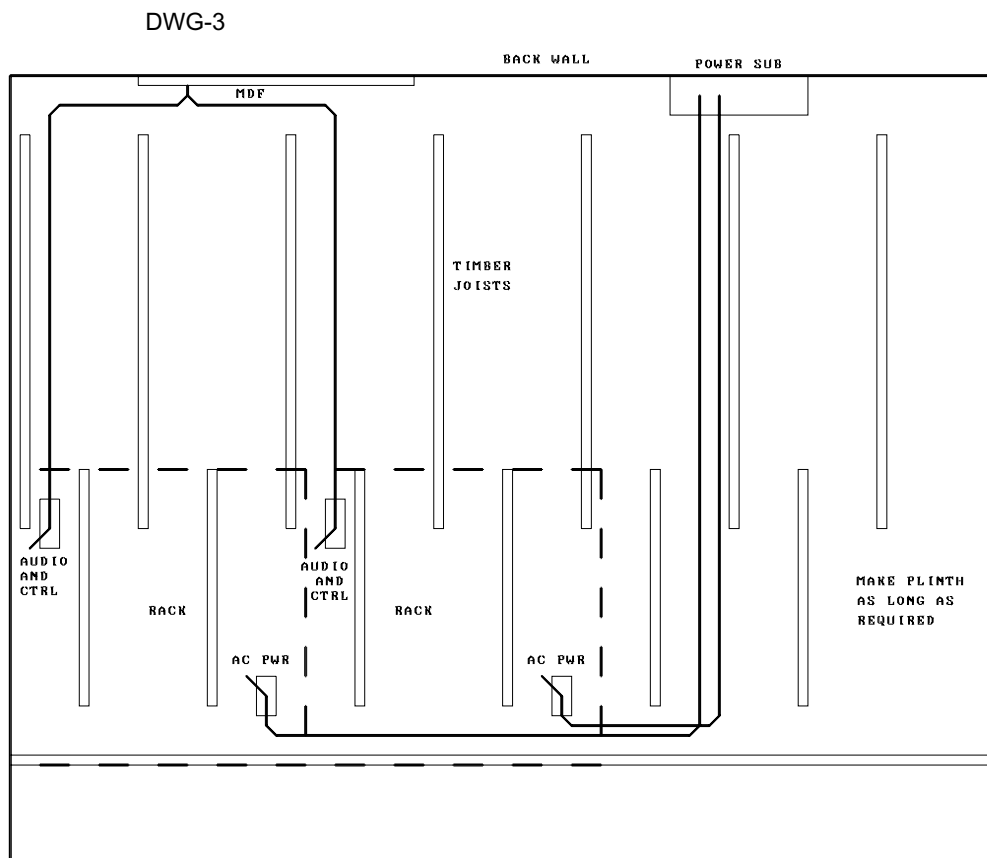
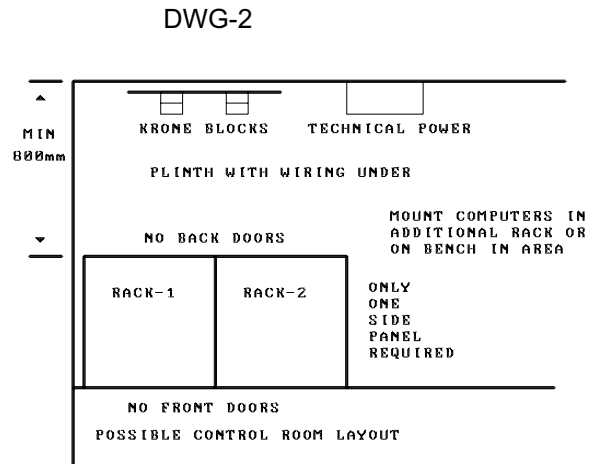
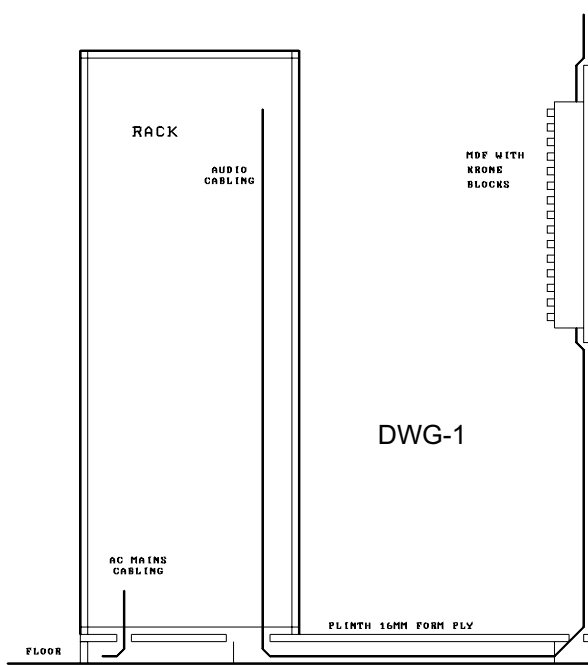
Attachment-3

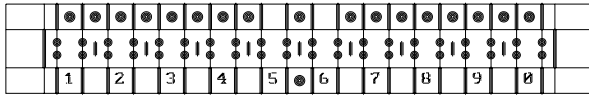
DWG-1



DWG-2







DWG-1

Illustration of Krone Block

Series 2 Disconnect Module, Backmount  
6089 1 102-02

Recommended for Backmount Frames

Series 2 Disconnect Module, Profil  
6089 1 121-02

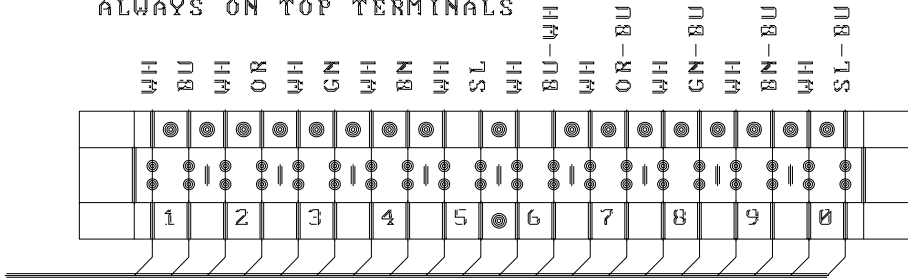
Recommended for Profil Mounting Frames

USING BACKMOUNT SYSTEM, TRUNK CABLING MAY BE UNDER TERMINALS OR TO THE LEFT

USING PROFIL SYSTEM, TRUNK CABLING BEST TO THE LEFT

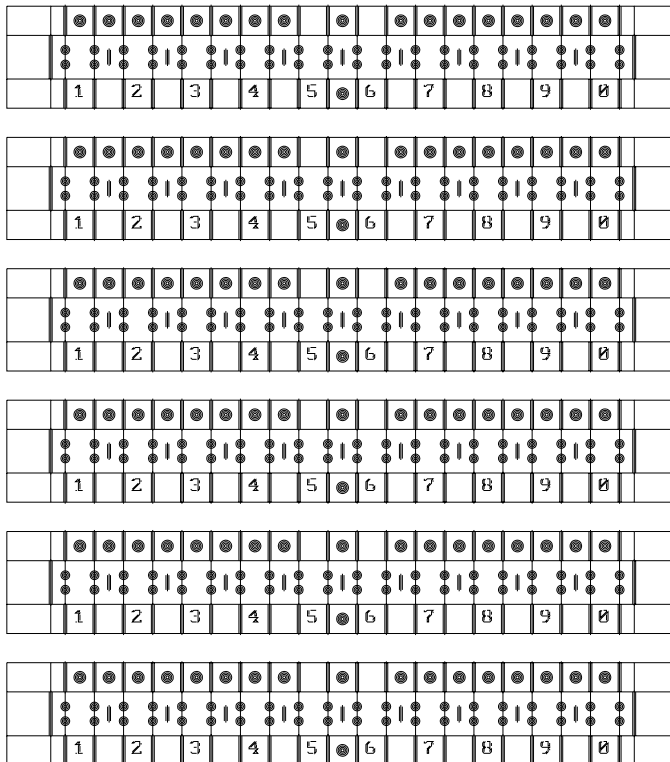
TRUNK CABLING TO AND FROM STUDIOS ETC ALWAYS ON TOP TERMINALS

DWG-2



JUMPERING TO OTHER KRONE BLOCKS ON BOTTOM TERMINALS  
JUMPERS ALWAYS ON LEFT SIDE

DWG-3



6

Numbering of Krone terminals, always from the bottom

5

4

3

2

1



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|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|          | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> | <b>11</b> | <b>12</b> | <b>13</b> | <b>14</b> | <b>15</b> | <b>16</b> | <b>17</b> | <b>18</b> | <b>19</b> | <b>20</b> | <b>21</b> | <b>22</b> | <b>23</b> | <b>24</b> |
| <b>A</b> | ◇        | ◇        | ◇        | ◇        | ◇        | ◇        | ◇        | ◇        | ◇        | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         |
| <b>B</b> | ◇        | ◇        | ◇        | ◇        | ◇        | ◇        | ◇        | ◇        | ◇        | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         | ◇         |

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| JACKFIELD NUMBER |  | LOCATION |  |
|------------------|--|----------|--|

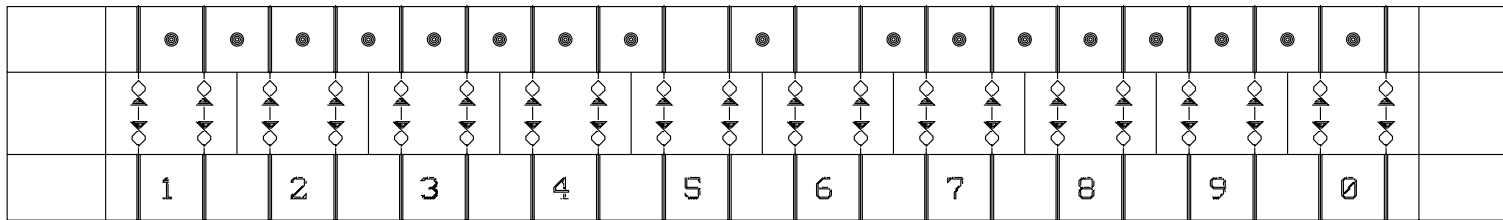
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WHEN USED IN CONTROL ROOM

CONNECT CABLING TO AND FROM STUDIOS AND AND EQUIPMENT IN RACKS TO TOP ROW

WHEN USED IN STUDIOS

CONNECT CABLING TO AND FROM CONTROL ROOM TO TOP ROW



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WHEN USED IN CONTROL ROOM

CONNECT JUMPERS TO OTHER KRONE TERMINALS TO BOTTOM ROW

WHEN USED IN STUDIOS

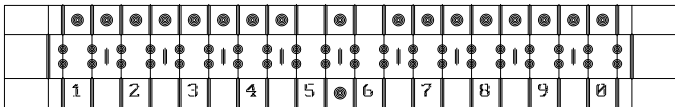
CONNECT EQUIPMENT TO BOTTOM ROW

|           |  |          |  |
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| KT NUMBER |  | LOCATION |  |
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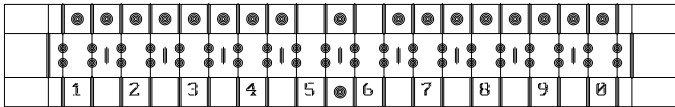
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**B A**

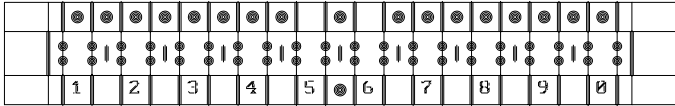
|                    |         |       |   |          |                     |                    |  |
|--------------------|---------|-------|---|----------|---------------------|--------------------|--|
| JACKFIELD NUMBER   |         | 1 A+B |   | LOCATION |                     | 6 AIR CONTROL ROOM |  |
| DELEG SW<br>IN-1 L | DIRECT  | ◇     | ◇ | NT-1 1   | STUDIO-1<br>PGM L   |                    |  |
| DELEG SW<br>IN-1 R | DIRECT  | ◇     | ◇ | NT-1 2   | STUDIO-1<br>PGM R   |                    |  |
| DELEG SW<br>IN-2 L | DIRECT  | ◇     | ◇ | NT-1 3   | STUDIO-2<br>PGM L   |                    |  |
| DELEG SW<br>IN-2 R | DIRECT  | ◇     | ◇ | NT-1 4   | STUDIO-2<br>PGM R   |                    |  |
| DELEG SW<br>IN-3 L | DIRECT  | ◇     | ◇ | NT-1 5   | AUTOMATION<br>PGM L |                    |  |
| DELEG SW<br>IN-3 R | DIRECT  | ◇     | ◇ | NT-1 6   | AUTOMATION<br>PGM R |                    |  |
| DELEG SW<br>IN-4 L | DIRECT  | ◇     | ◇ | NT-1 7   | SATT RX<br>PGM L    |                    |  |
| DELEG SW<br>IN-4 R | DIRECT  | ◇     | ◇ | NT-1 8   | SATT TX<br>PGM R    |                    |  |
| AUDIO PROC<br>IN L | DIRECT  | ◇     | ◇ | DIRECT   | DELEG SW<br>OUT-1 L |                    |  |
| AUDIO PROC<br>IN R | DIRECT  | ◇     | ◇ | DIRECT   | DELEG SW<br>OUT-1 R |                    |  |
| AUDIO DA<br>IN L   | DIRECT  | ◇     | ◇ | DIRECT   | DELEG SW<br>OUT-2 L |                    |  |
| AUDIO DA<br>IN R   | DIRECT  | ◇     | ◇ | DIRECT   | DELEG SW<br>OUT-2 R |                    |  |
| STEREO GEN<br>IN L | DIRECT  | ◇     | ◇ | DIRECT   | AUDIO PROC<br>OUT L |                    |  |
| STEREO GEN<br>IN R | DIRECT  | ◇     | ◇ | DIRECT   | AUDIO PROC<br>OUT R |                    |  |
| MONITOR<br>IN 7 L  | DIRECT  | ◇     | ◇ | NT-1 9   | REC STUDIO<br>OUT L |                    |  |
| MONITOR<br>IN 7 R  | DIRECT  | ◇     | ◇ | NT-1 0   | REC STUDIO<br>OUT R |                    |  |
| MONITOR<br>IN 8 L  | DIRECT  | ◇     | ◇ | DIRECT   | OFF AIR RX<br>OUT L |                    |  |
| MONITOR<br>IN 8 R  | DIRECT  | ◇     | ◇ | DIRECT   | OFF AIR RX<br>OUT R |                    |  |
| TIE LINE 1         | NT-12 1 | ◇     | ◇ | DIRECT   | AUDIO DA<br>OUT-1 L |                    |  |
| TIE LINE 2         | NT-12 2 | ◇     | ◇ | DIRECT   | AUDIO DA<br>OUT 1 R |                    |  |
| PARALLEL           | NONE    | ◇     | ◇ | DIRECT   | AUDIO DA<br>OUT-2 L |                    |  |
| PARALLEL           | NONE    | ◇     | ◇ | DIRECT   | AUDIO DA<br>OUT 2 R |                    |  |
| PARALLEL           | NONE    | ◇     | ◇ | NT-12 3  | OB LINE 1           |                    |  |
| PARALLEL           | NONE    | ◇     | ◇ | NT-12 4  | OB LINE 2           |                    |  |



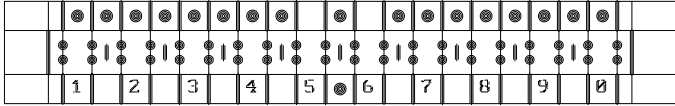
Misc and Control  
KT- ??? STUDIO-2/4



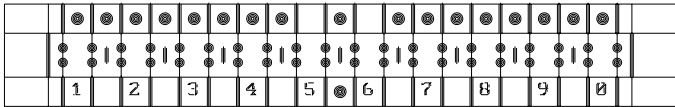
High Level Inputs  
KT- ??? STUDIO-2/3



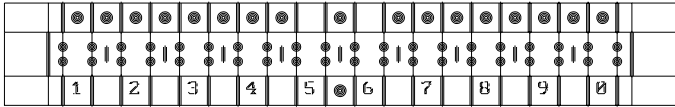
Talkback and Aux Inputs  
KT- ??? STUDIO-2/2



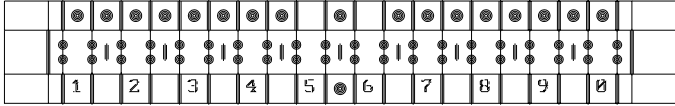
Main Outputs and Monitoring  
KT- ??? STUDIO-2/1



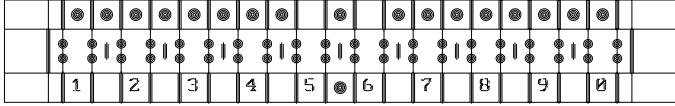
Misc and Control  
KT- ??? STUDIO-1/4



High Level Inputs  
KT- ??? STUDIO-1/3



Talkback and Aux Inputs  
KT- ??? STUDIO-1/2



Main Outputs and Monitoring  
KT- ??? STUDIO-1/1