

square
one
splitter

**operator
manual**



OPERATOR MANUAL

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Square ONE Splitter - Operator Manual
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In line with the company's policy of continual improvement, specifications and function may be subject to change without notice. This Operators Manual was correct at the time of writing. E&OE.



IMPORTANT SAFETY INSTRUCTIONS



The lightning flash with arrowhead symbol within an equilateral triangle, is intended to alert the user to the presence of uninsulated "Dangerous Voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

- 1 Read these instructions.
- 2 Keep these instructions.
- 3 Heed all warnings.
- 4 Follow all instructions.
- 5 Do not use this apparatus near water.
- 6 Clean only with a dry cloth.
- 7 Do not block any of the ventilation openings. Install in accordance with the manufacturer's instructions.
- 8 Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9 Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10 Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.



The exclamation point within an equilateral triangle, is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

- 11 Only use attachments/accessories specified by the manufacturer.
- 12 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 13 Refer all servicing to qualified personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- 14 Use the mains plug to disconnect the apparatus from the mains.
- 15 **Warning: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.**
- 16 **Do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the equipment.**
- 17 **The mains plug of the power supply cord shall remain readily operable.**

PRECAUTIONS

This equipment is supplied by a mains voltage that can cause electric shock injury!

The following special limitations must be observed in order to maintain safety and electromagnetic compatibility performance.

Power

The internal power supply is a switch mode type that automatically senses the incoming mains voltage and will work where the nominal voltage is in the range 100V a.c. to 240V a.c.

A single, fused IEC mains inlet is provided on the rear panel. The correct lead for connection in the area to which the unit was shipped is supplied with the unit. The equipment should only be plugged into the mains outlet using the supplied lead.

When removing the equipment's electric plug from an outlet, always hold the plug itself and not the cable, as pulling out the plug by the cable can damage it, and never insert or remove an electric plug with wet hands.

Grounding

In the event of ground loop problems, use the earth **LIFT** switches provided on both sets of outputs (rear panel). If you have ground loop problems relating to the inputs, use a DI box, for example, Klark Teknik's DN100, to provide isolation.

Handling the equipment

Before moving the equipment, disconnect it from the mains, and when lifting or moving it, always take its size and weight into consideration.

Avoid inserting or dropping foreign objects, such as paper, plastic, metal etc., into any gaps or openings on the equipment, for example, vents. If this happens, turn off the power immediately and unplug the power from the a.c. outlet. Then have the equipment inspected by the manufacturer's qualified service personnel.

Installation

Before installing and connecting up the equipment, check that both the mains supply and the quality of earthing are adequate for the equipment. Also check that the mains power supply voltage rating corresponds with the local mains power supply and that the mains fuse is of the correct type and rating.

Unless advised otherwise, optional equipment must only be installed by service personnel and in accordance with the appropriate assembly and usage regulations.

Location

Ideally, a cool, well ventilated area is preferred, away from power distribution equipment or other potential sources of interference. Do not install this equipment in a location subjected to excessive heat, dust or mechanical vibration and keep the equipment out of direct sunlight. Where necessary use fan cooled racks.

This unit is only intended for rack mounting.

Audio connections

To ensure the correct and reliable operation of your Square ONE Splitter, only high quality balanced, screened, twisted pair audio cable should be used. XLR connector shells should be of metal construction so that they provide a screen when connected to the unit and should have Pin 1 connected to the cable screen.

PRECAUTIONS

Phantom power

Never apply phantom power to any unbalanced input source. Before powering the unit, always check the +48V status of any phantom powered equipment connected to any of the 16 output XLRs on the rear panel. If +48V is detected on any of these outputs the unit will apply +48V to any devices connected to their corresponding inputs (front or rear panel) as soon as the unit is powered up.

Radio frequency interference

Class B device

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

Electric fields

Caution:

In accordance with Part 15 of the FCC Rules & Regulations, "... changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment."

Should this product be used in an electromagnetic field that is amplitude modulated by an audio frequency signal (20Hz to 20kHz), the signal to noise ratio may be degraded. Degradation of up to 60dB at a frequency corresponding to the modulation signal may be experienced under extreme conditions (3V/m, 90% modulation).

Operation

Never remove, for example, covers, housings or any other safety guards.

Never operate the equipment with the covers removed or if safety guards are ineffective or their effectiveness has been reduced.



EC-Declaration of Conformity

The undersigned, representing the following manufacturer

Manufacturer:

Telex Communications (UK) Limited

Address:

Klark Teknik Building, Walter Nash Road,
Kidderminster, Worcestershire DY11 7HJ

hereby declares that the following product

Product Type Number	Product Description	Nominal Voltage(s)	Current	Freq.
Square ONE Splitter	Microphone Splitter	115V AC 230V AC	400mA 200mA	50/60Hz

is in conformity with the regulations of the following marked EC-directive(s)
and bears the CE-mark accordingly

reference number	title
2004/108/EC	EMC Directive (EMC)
2006/95/EC	Low-Voltage Directive (LVD)

The conformity of the product with EC directives is provided by the compliance with the following standards:

Standards / date

reference number	title
EN50081/1	Generic Standard Using EN55103 Limits and Methods
EN55103	Class B Conducted Emissions PAVI
EN55103	Class B Radiated Emissions PAVI
EN61000-4-4	Fast Transient Bursts at 2kV
EN61000-4-2	Static Discharge at 4kV
EN60204	Electrical Stress Test
EN60065 7 th Edition	Electrical Safety

Place, date: Kidderminster, UK
19th October 2007

Managing Director Business Line

Printed name: John Oakley

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Printed name: Simon Harrison



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Introduction

Thank you for purchasing a Klark Teknik Square ONE Splitter. Your Square ONE Splitter forms an integral part of the Square ONE range, which was conceived by Klark Teknik to offer audio professionals a suite of easily accessible, high-performance audio equipment, designed to provide no-compromise sonic quality with a feature set that offers all essential facilities and functions. It represents the very best of British design and engineering combined with contemporary, efficient manufacturing methods, and will give you many years of reliable service.

All this is backed up, of course, by the standard Klark Teknik three-year warranty.

Please take the time to complete and return the registration card or fill in the Warranty Registration Form online by visiting our website at www.ktsquareone.com and, to obtain the best results with a minimum of effort, also read this operator manual.

Finally, enjoy your Klark Teknik Square ONE Splitter!

About the Square ONE Splitter

The Square ONE Splitter is a user-friendly, high-performance, eight-channel, active microphone (mic) splitter designed for live sound reinforcement. Housed in a rugged and compact 2U rack enclosure, the Square ONE Splitter offers a cost-effective and space-effective method of providing up to 24 outputs from 8 sources. In addition, the Square ONE Splitter can also function as a 1 x 16 media splitter.

The Square ONE Splitter can distribute up to eight mic or line level signals to multiple locations, while maintaining signal integrity and minimising noise interference. Its primary application is to split the audio signals on-stage into individual feeds for front of house (FOH), monitoring (MON), multi-track recording, live broadcasting or indeed any other requirement; see Figure 1, "Typical channel I/O connection options," on page 2. Although the Square ONE Splitter is a cost-effective unit, its signal integrity and audio performance mean it can be used with any console, and the quality of its preamp and circuitry can enhance the audio performance of lower cost consoles.

The Square ONE Splitter has eight channels, each consisting of two parallel inputs, two preamps, and a total of three balanced outputs. Two of the outputs (identical) are electronically balanced, while the other is transformer isolated. Both paralleled mic inputs feed two integral, superbly specified mic preamps, which are based on the circuitry used in the DL431 Mic Splitter (part of the acclaimed Midas XL8 Live Performance System). One preamp provides adjustable gain and drives the two electronically balanced outputs at increased levels (up to line level), while the second provides a fixed gain copy of the input and drives the transformer isolated output.

Channel controls consist of: solo, filter and phantom voltage pushbutton switches each with an adjacent LED for on/off indication; a gain control knob; and a dedicated peak reading meter for displaying the output at all times. The solo system allows any channel(s) to be monitored via the integral headphone amplifier. The gain control knob is used for optimising the preamp gain. Standard +48V phantom powering is individually switchable on each channel and has remote operation by virtue of its unique phantom voltage sensing feature.

Additional controls include a headphone level control (just above a headphone jack), a global ground lift switch per set of electronically balanced outputs and a media split switch. The media split switch activates media split mode, in which the output of channel 8 is distributed to all 16 electronically balanced outputs.



All audio connections are on balanced XLRs (wired pin 2 hot) featuring gold plated connectors. The mic inputs and transformer balanced outputs are mounted on the front panel for easy access, and the two electronically balanced outputs are on the rear panel along with the duplicate set of inputs.

An integral switch mode power supply automatically adapts to mains voltages in the range 100 to 240 volts (50 to 60Hz). An LED on the front panel indicates when power is applied to the unit; there is no mains power on/off switch.

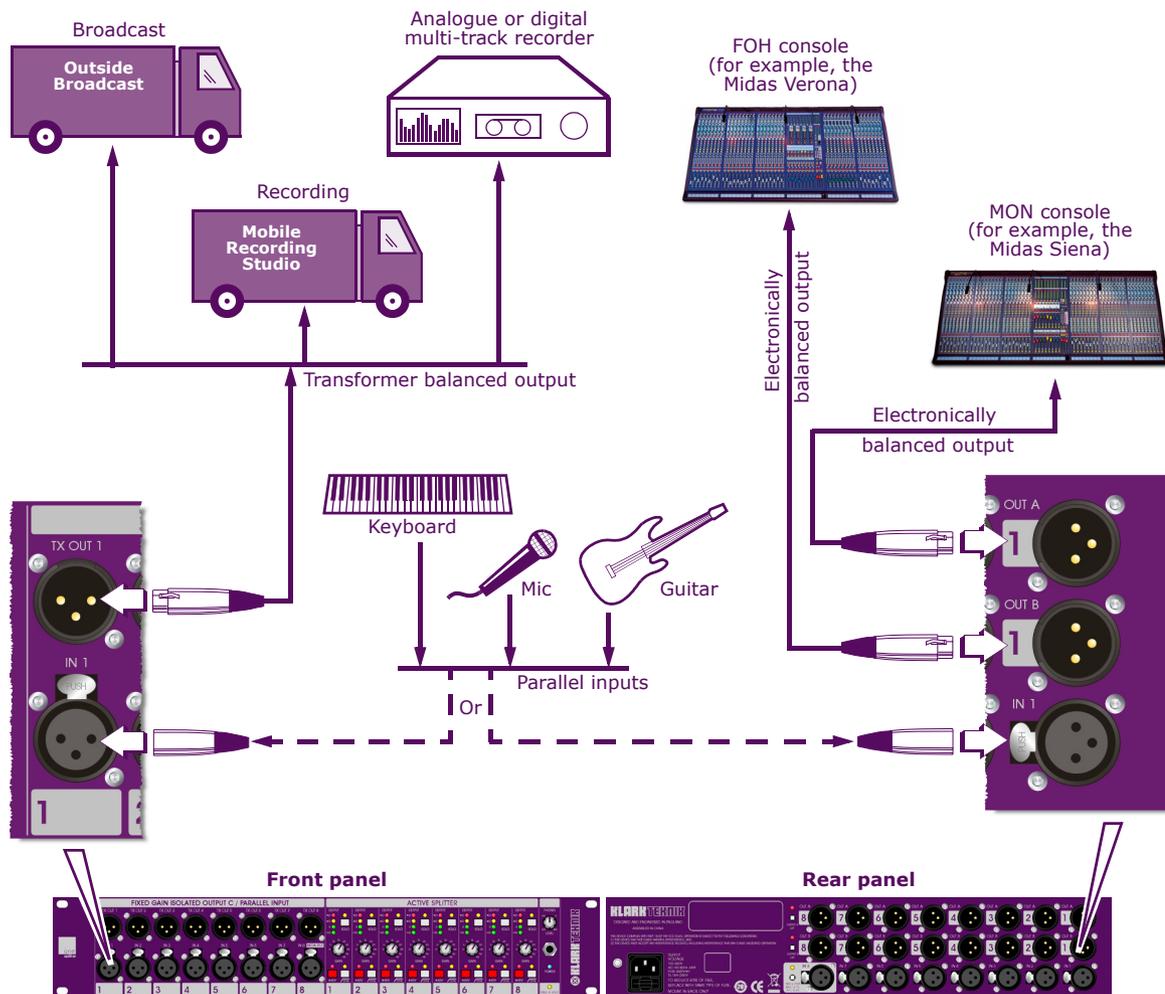


Figure 1: Typical channel I/O connection options



Features

The Square ONE Splitter has eight channels, each with:

- Two mic preamps, based on those used in the acclaimed Midas XL8 Live Performance System¹; one drives the two electronically balanced outputs and the other drives the transformer isolated output.
- Two paralleled inputs, one front and one rear.
- Two electronically balanced outputs (rear panel), derived from the front control knob-adjusted mic preamp.
- One transformer isolated output (front panel), derived from a second fixed gain preamp.

Each channel is clearly labelled and includes the following controls:

- Rotary gain switch with nine positions. Range is from 0dB to +40dB in 5dB steps.
- +48V phantom power switch with adjacent LED for on/off indication.
- 30Hz high pass filter switch with adjacent LED for on/off indication.
- Solo switch with adjacent LED for on/off indication.
- Output meter with four LEDs, which indicate -15dB, 0dB, +12dB and +21dB.

Additional features include:

- Headphone output (1/4" jack) and level control to monitor the solo bus.
- Two global ground lift switches, one for each set of electronically balanced outputs.
- Media split switch for routing channel 8 to all 16 electronically balanced outputs.
- Phantom power sensing for remotely enabling +48V on the inputs when phantom power is activated from any attached console.
- Male (output) and female (input) XLRs with gold plated connectors.
- Power LED for on/off indication.
- Mains supplied via an IEC socket on rear panel.
- Fuse drawer contains easily replaceable mains fuse and a compartment for a spare.

1. The mic input of the Square ONE Splitter is based around the same circuitry as used in the DL431 Mic Splitter, which is part of the Midas XL8 Live Performance System, and features exceptionally low noise and distortion, combined with generous headroom. The Midas XL8 Live Performance System has been specifically designed for live use and has, at its core, the XL8 Control Centre, which is a user-friendly, state-of-the-art, high performance digital console.



How to use the Square ONE Splitter

This section shows you how to get the most out of your Square ONE Splitter.

Using the main inputs

To maximise the sonic benefits of active splitting, the Square ONE Splitter should be located close to the mic sources and connected to them as directly as is practical. In this way the unit can provide active drive to all the distributing cable systems. This massively reduces capacitive and resistive loading on the mic, as compared to other non-active splitting systems, so that it captures the sound faithfully, without high frequency losses or the introduction of unwanted electrical interference. This improvement in sound quality is normally very noticeable.

The Square ONE Splitter can also receive higher signal levels such as those produced by some condenser mics or even line level signals. In the case of unbalanced line level signals, it may be advisable to utilise a DI box in advance of the splitter to eliminate any possibility of ground-induced noise. However, with balanced line signals the only precaution likely to be required is a break in the XLR pin one connection at the input to the splitter.

Using the outputs

The primary application for the Square ONE Splitter is in concert sound (public address) systems where it provides output feeds for FOH and MON consoles. It utilises an active preamp in order to maximise the signal to noise ratio and headroom, before driving the long cable runs that are typically associated with such systems. In this application the grounding regime is normally planned and controlled by the sound contractor such that isolating transformers are not required. The Square ONE Splitter can assist in the elimination of ground loops within the system, if required, by utilising the integral **LIFT** switches that can disconnect the XLR pin one terminal on one, both, or neither output sets (**OUT A** or **OUT B**), as required.

As a secondary function the Square ONE Splitter also provides a transformer isolated output for every channel. This is intended for varied and occasional use as the needs arise in the event that an additional split is required; typically, this is for a broadcast feed or recording. These situations cannot always be planned for and are normally outside the sound contractor's control. In these instances transformer isolation is desirable to eliminate any ground interference that the additional connection could otherwise bring to the whole system. The XLR pin one terminals are not connected on these outputs.

Traditionally, active splitters have provided transformer splits driven from the same preamp that drives the main system outputs (FOH and monitor), but the Square ONE Splitter utilises separate fixed gain preamps to buffer the transformer feeds. They operate at a nominal gain of -6dB to cope with potentially large low frequency line level input signals without saturating the transformers. This provides an additional benefit that is very popular with broadcasters. It means that when they are using this output they have total control of the gain and headroom of their part of the system just as if it had been from a passive split, but without the risk of ground-induced noise interference. With older designs that provide a transformer feed after the main preamp, the level fed to the broadcaster can change without warning whenever the concert sound crew decide to adjust their levels. The dynamic range of the transformer outputs is greater than 140dB; something broadcasters will also approve of.



Using the parallel inputs

Typically, the mic signals - from different stage locations - are fed to the splitting systems using multi-channel stage boxes and cables. This infrastructure is normally subjected to tremendous stresses during the show and during set up/breakdown, and it is not unusual to develop intermittent faults on some individual signal lines. If this occurs there is normally little time available to de-bug the problem fully before the show. However, the Square ONE Splitter provides a solution for such circumstances by providing an additional parallel input on the front panel of the unit for emergency connection of a spare mic or individual replacement cable. These inputs can also be used for single mic locations, eliminating the requirement to utilise an 8-way stage box and multi-core cable for just one mic.



Getting started

Observing the guidelines in the “IMPORTANT SAFETY INSTRUCTIONS” and “PRECAUTIONS” sections towards the front of the manual, carry out the following to get your Square ONE Splitter unit fully operational.

Unpacking

Carefully unpack your Square ONE Splitter equipment package.

Inspect the Square ONE Splitter unit carefully for any signs of damage that may have occurred during transit and notify the courier immediately if any is discovered.

Check the contents of your Square ONE Splitter equipment package. If there are any parts missing, incorrect or faulty, please contact your local distributor or Klark Teknik at the address at the front of this manual.

Please retain the original packing in case you should need to return the equipment to the manufacturer or supplier, or transport or ship the unit later.

Checking the mains fuse

Before installing the equipment, make sure that the mains fuse fitted is of the correct type and rating for your unit. To do this refer to “Service information” on page 28.

Installation

This unit is designed for mounting in any 19” EIA standard rack and occupies 2U of rack space. Four rack-mount holes in the front panel are provided for rack mounting and are designed to fully support the weight of the unit in the rack.

Note: *Avoid over-tightening the rack-mount screws, as this could damage the front panel.*

The position of the unit will depend upon how it is to be used. However, when positioning the unit, avoid placing it where the control knobs may be damaged by being accidentally knocked or snapped off. Avoid mounting the unit directly above or below power amplifiers or power supplies that radiate excessive magnetic fields or heat. Ensure that the ventilation apertures on either side of the unit are not blocked or obstructed.

This unit must be earthed. If ground loop problems are encountered, the global ground lift switches (rear panel) for each electronically balanced output may be used. It is also permissible to disconnect the cable screen at one end or other of the output cables, though the signal input cable screen must be connected at both ends to ensure the phantom powering operates correctly.

For unbalanced use, pin 3 of any output XLR may be grounded at the destination end of the cable.

The source impedance of the electronically balanced outputs is 50 ohms while the transformer balanced outputs have a source impedance of 75 ohms. Both are designed to feed a minimum load of 600 ohms.



Connecting the power cable

Making sure that the mains power at the power outlet is off, connect the mains cable supplied with your Square ONE Splitter to the mains power outlet and then to the mains socket at the rear of your unit.

Connecting the audio cables

Making sure that all equipment is switched off, connect your Square ONE Splitter to the rest of your audio equipment as shown in the following subsections.

The mic preamp gain may be adjusted using the **GAIN** control knob, the gain range being adequate to accommodate most mics, keyboards, DI boxes, backline preamp outputs and active guitar/basses. However, passive guitars require a high impedance load and should be connected via a suitable active DI box, such as the Klark Teknik DN100.

Channel I/O pin-outs

The following diagram shows the pin-outs for both the male and female chassis connectors on the Square ONE Splitter, when connecting to balanced equipment.

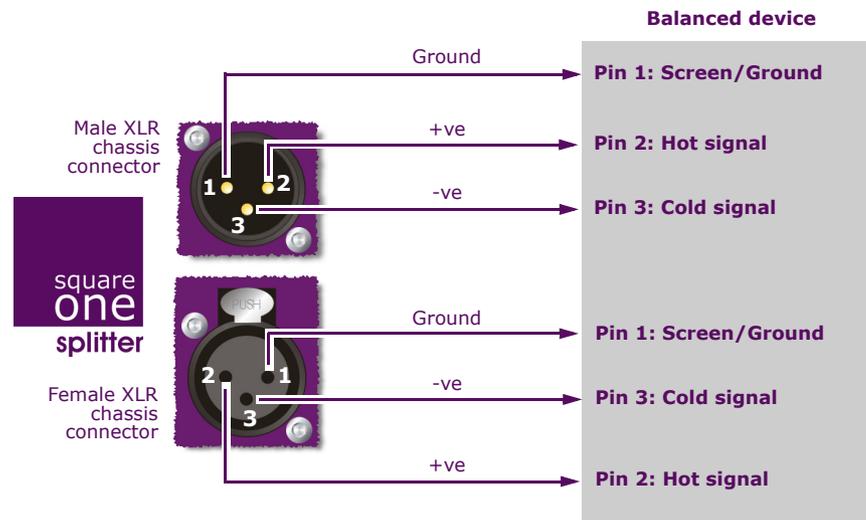


Figure 2: I/O connections to balanced devices



Connecting to unbalanced equipment

Important:

We recommend that you only connect balanced devices to your Square ONE Splitter. However, if you do have to connect unbalanced devices, we recommend that you use the Klark Teknik DN100 DI box to balance the signal first.

Ideally, you will be making the best use of the low-noise high-headroom balanced inputs of the Square ONE Splitter by connecting to similarly balanced equipment. However, if you do have to connect to unbalanced devices, the following wiring is recommended for best results.

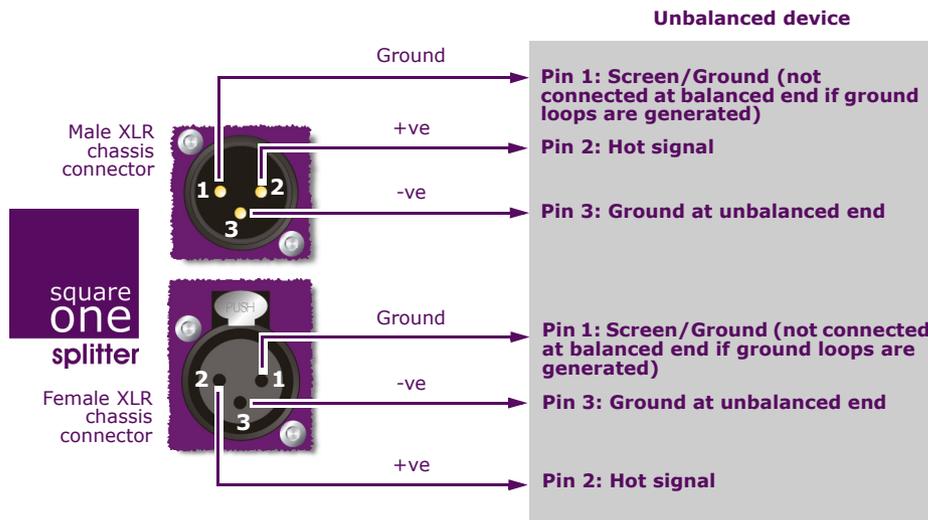


Figure 3: I/O connections to unbalanced devices

Powering the unit

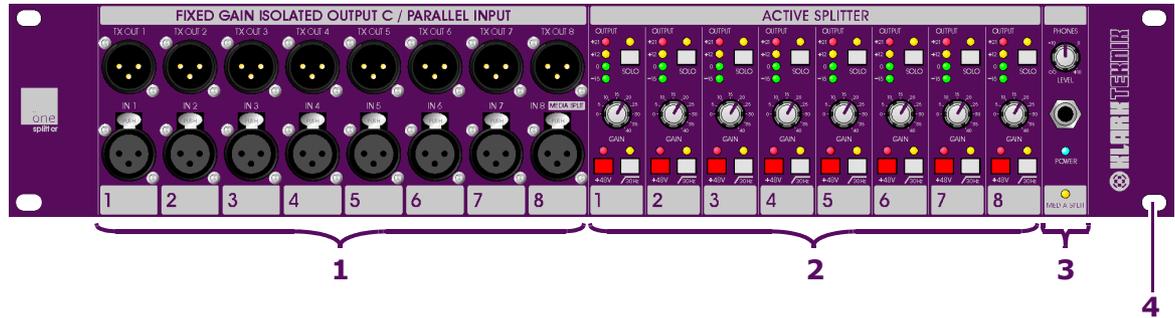
Switch the power on at the mains power outlet. (The Square ONE Splitter does not have a mains power on/off switch.)

Your unit is now ready to operate.



Front panel

The front panel of the Square ONE Splitter is divided into three main sections, as follows:

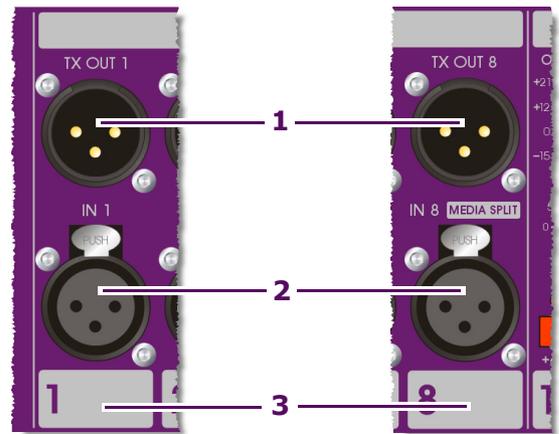


- 1 FIXED GAIN ISOLATED OUTPUT C / PARALLEL INPUT:** Eight-channel section containing the paralleled inputs and transformer isolated balanced outputs; see "FIXED GAIN ISOLATED OUTPUT C / PARALLEL INPUT section" on page 9.
- 2 ACTIVE SPLITTER:** Eight-channel section containing the channel controls; see "ACTIVE SPLITTER section" on page 10.
- 3 Phones, power and media split:** see "Phones, power and media split section" on page 11.
- 4** Four cut-outs for rack mounting.

FIXED GAIN ISOLATED OUTPUT C / PARALLEL INPUT section

The functions of channels 1 to 8 in this section are similar, although the input of channel 8 is also used for the media split function.

- 1 TX OUT 1 to TX OUT 8 sockets:** Eight transformer isolated balanced outputs, each with a male XLR chassis connector.
- 2 IN 1 to IN 8 sockets:** Eight electronically balanced inputs, each with a female XLR chassis connector. Socket **IN 8** is one of the two channel 8 media split inputs, the other being on the rear panel.
- 3** Channel number and write-on panel.





ACTIVE SPLITTER section

All of the switches in this section are of the two-position latching pushbutton type. Each switch, unless otherwise stated, has an adjacent LED for on/off indication, where illuminated LED = switch is on, and extinguished LED = switch is off.

1 OUTPUT level meter (dBu): Dedicated peak reading, four-segment audio level LED meter that follows the output level at all times, no matter how the controls are set. The segments are: -15dBu (green); 0dBu (green); +12dBu (yellow); and +21dBu (red). Illumination of the red LED indicates the signal is being clipped.

2 Yellow LED for SOLO switch.

3 SOLO switch: Switches solo on/off. With solo on, post mic amp gain audio is sent to the **PHONES** output, allowing you to listen to and monitor the audio content locally.

4 GAIN control knob: Nine-way control knob adjusts the amount of mic gain added to the input signal before it is sent to the electronically balanced outputs. Range is from 0dB to +40dB in 5dB steps.

Note: The transformer isolated outputs are derived before the mic amp gain stage and are buffered and driven at -6dB operating gain, with no user adjustment available.

5 Yellow LED for 30Hz switch.

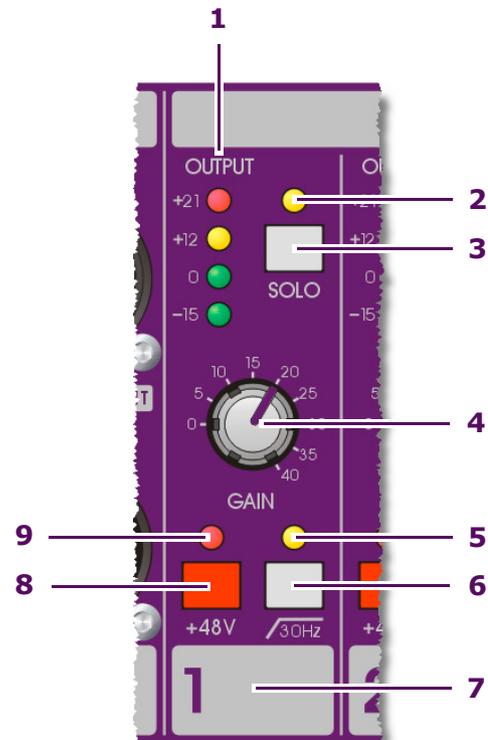
6 30Hz switch: Switches the 30Hz high pass filter on/off. Operating at 30Hz, the filter acts as an 'anti-rumble' filter, which aids the removal of unwanted high energy low frequency elements in the audio signal.

7 Channel number and write-on panel.

8 +48V switch: Switches the +48V phantom power supply on/off.

Additionally, there is the facility of phantom power sensing provided on all electronic outputs that remotely enables +48V on the splitter mic input XLRs when phantom power is activated from any attached console. This is indicated by the illumination of its associated LED.

9 Red LED for +48V switch. This LED is for +48V switch on/off indication, but also illuminates when phantom power is detected on either or both of the output XLRs (rear panel), even when the **+48V** switch is off.

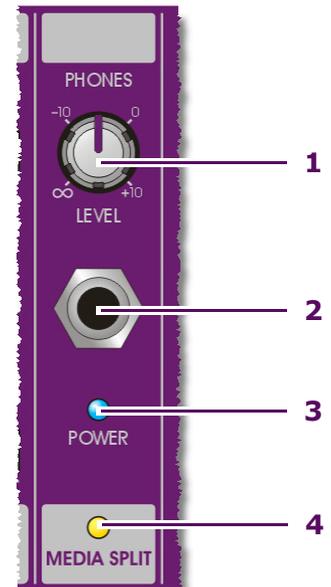




Phones, power and media split section

- 1 LEVEL control knob (dB):** Adjustment of the headphones signal in the range ∞ (off) to +10dB.
- 2 Headphone jack:** Standard TRS-type 1/4" jack for connecting headphones, enabling you to monitor the solo function.
- 3 Blue POWER LED:** Mains power on/off indicator. When LED is illuminated, mains power is on. (There is no mains on/off switch on the Square ONE Splitter.)
- 4 Yellow MEDIA SPLIT LED:** Illuminates to indicate that media split is in operation. This has a duplicate LED on the rear panel; see item 5 in "Media split and ground lift switches" on page 13.

Note: Headphone output includes +10dB of fixed gain.



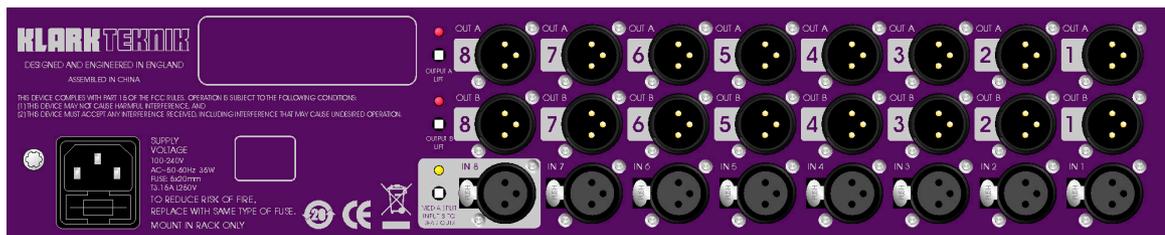


Rear panel

The rear panel provides the power and primary I/O connections for the Square ONE Splitter. Additionally, the media split and ground lift switches are adjacent to the channel 8 connectors.

You will find important information, such as warnings and cautions, power supply and fuse specifications, safety and compliance standards markings etc., printed on the left-hand side of the panel.

The correct mains lead for the country to which the unit was shipped is supplied with the unit.

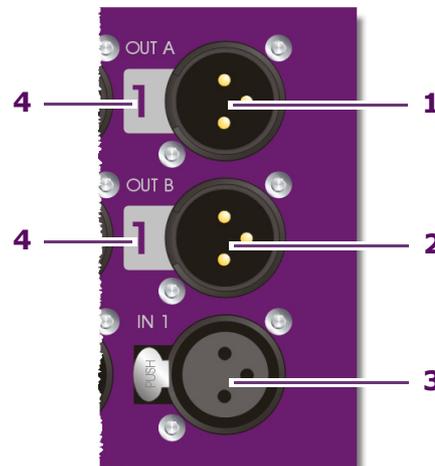


Channel I/O connections

The functions of channels 1 to 8 in this section are similar, although the input of channel 8 is also used for the media split function (see "Media split and ground lift switches" on page 13).

Please refer to "Connecting the audio cables" on page 7 for pin assignments.

- 1 OUT A sockets:** Eight electronically balanced outputs, each with a male XLR chassis connector.
- 2 OUT B sockets:** Eight electronically balanced outputs, each with a male XLR chassis connector.
- 3 IN 1 to IN 8 sockets:** Eight electronically balanced inputs, each with a female XLR chassis connector. Socket **IN 8** is one of the two channel 8 media split inputs, the other being on the front panel.
- 4** Channel number.

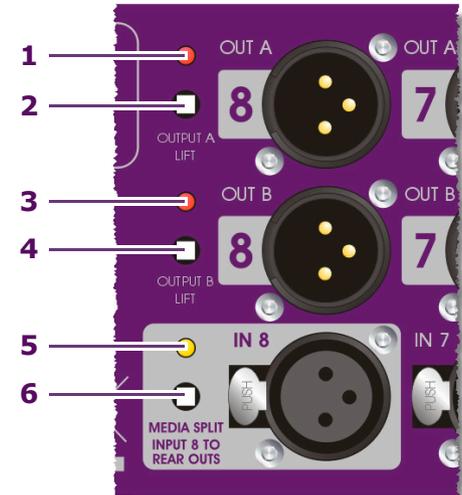




Media split and ground lift switches

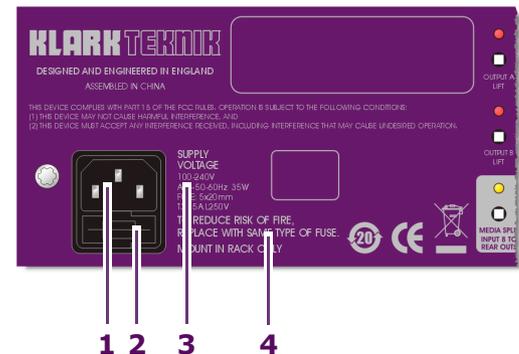
The output lift and media split switches are deliberately recessed to prevent them being inadvertently switched on or off. Each switch has an LED above for on/off indication, where illuminated LED = switch is on, and extinguished LED = switch is off.

- 1 Red LED for OUTPUT A LIFT switch.**
- 2 OUTPUT A LIFT switch:** Recessed switch for globally disconnecting the internal ground from the **OUT A** output connector on all eight channels.
- 3 Red LED for OUTPUT B LIFT switch.**
- 4 OUTPUT B LIFT switch:** Recessed switch for globally disconnecting the internal ground from the **OUT B** output connector on all eight channels.
- 5 Yellow LED for MEDIA SPLIT switch.** This LED is duplicated on the front panel; see "ACTIVE SPLITTER section" on page 10.
- 6 MEDIA SPLIT switch:** Recessed switch for switching the unit to media split mode; see "Media split mode" on page 15 for details of operation.



Mains supply

- 1 IEC socket:** Auto voltage sensing, switch mode power supply that operates where the nominal mains voltage is in the range 100V a.c. to 240V a.c.
- 2 Fuse drawer:** Contains the mains fuse at the rear of a two-compartment drawer. The front compartment contains a spare fuse. Always replace the mains fuse (and spare) with the same type and rating; see "Checking/replacing the mains fuse" on page 28 for details.
- 3 Supply voltage and fuse specifications:** Details of the supply voltage and the mains fuse are printed here.
- 4 Fuse warning information:** Details on replacing the mains fuse with the same type is printed here.





Operation

Basic operation



Caution:

Never apply phantom power to any unbalanced input source. Before powering the unit, always check the +48V status of any phantom powered equipment connected to any of the 16 output XLRs on the rear panel. If +48V is detected on any of these outputs the unit will apply +48V to any devices connected to their corresponding inputs (front or rear panel) as soon as the unit is powered up.

Connect all condenser mics and active DI boxes to the Square ONE Splitter before applying phantom power. Ensure that the sound system level is turned down at this stage to prevent switch-on thumps or acoustic feedback. The phantom power should be switched off for any channel being used with a dynamic mic or passive DI box, although there shouldn't be any problems if the phantom power is inadvertently left switched on provided the sources are wired for balanced operation and connected using conventionally wired balanced cables.

Use the solo facility to check the level of each input individually and set the gain to achieve the highest possible signal level without clipping, that is, without the red LED of the **OUTPUT** meter illuminating. Leave sufficient headroom to allow for unplanned increases in level during performance.

Both the transformer isolated and electronically balanced outputs offer exceptional audio quality combined with excellent line driving capability. However, the transformer outputs may be preferred in situations where absolute electrical isolation must be maintained, such as running feeds to mobile studios or outside broadcast facilities. The fixed gain of the transformer outputs will also be preferable for broadcast trucks because they can have totally independent control of their system gain, headroom etc.

In theory, the electronically balanced outputs remove any opportunity for the audio transformers to colour the sound. However, in practice the sonic quality of the two types of output is very similar.

Solo bus operation

At the required channel, press the **SOLO** switch to switch solo on for that channel; its yellow LED (just above) will illuminate to show that solo is switched on. Soloing a channel switches its signal onto the internal solo bus, which allows it to be monitored in isolation via the headphone socket on the front of the unit. You can solo more than one channel at a time.

Using headphones

To hear any soloed channel(s) over the headphones, plug them into the **PHONES** socket at the right-hand side of the front panel. The socket is a standard 1/4" TRS jack, which will accept any set of conventionally wired stereo headphones. Adjust the volume using the **LEVEL** control knob.



Media split mode

To switch the unit to media split mode, press the recessed **MEDIA SPLIT** switch on the rear panel; its yellow LED and also the one on the front panel will illuminate to show that the switch is on. In media split mode, the input to channel 8 - on both the front and rear panels - is distributed to all 16 electronically balanced outputs (rear panel) via its mic preamp, which is controlled via the channel 8 **GAIN** control knob; all of the meters will follow the output of channel 8.

Note: *In media split mode, the transformer isolated outputs of channels 1 to 7 (front panel) still have the ability to act as independent isolated feeds, if required, via the associated secondary fixed gain mic preamps. If doing so, best practice is to set the unused mic gains to minimum.*

Using the ground lift switches

If you are experiencing ground loop problems, switch on one or both of the ground lift switches, that is, **OUTPUT A LIFT** and **OUTPUT B LIFT** on the rear panel. Each ground lift switch *lifts*, or disconnects, globally its respective set of eight outputs (**OUT A** or **OUT B**) on all eight channels.

The ground lift switches are used to eliminate ground loop problems, which are caused by differences in ground potential between items of equipment; this creates a voltage difference in the grounds of the equipment and results in a mains frequency hum within the system.

With a ground lift switch switched on, pin 1 of each of its associated output XLRs will still be connected to chassis ground via capacitors. This provides an a.c. path to ground, while blocking any d.c. current flow resulting from a ground loop condition.

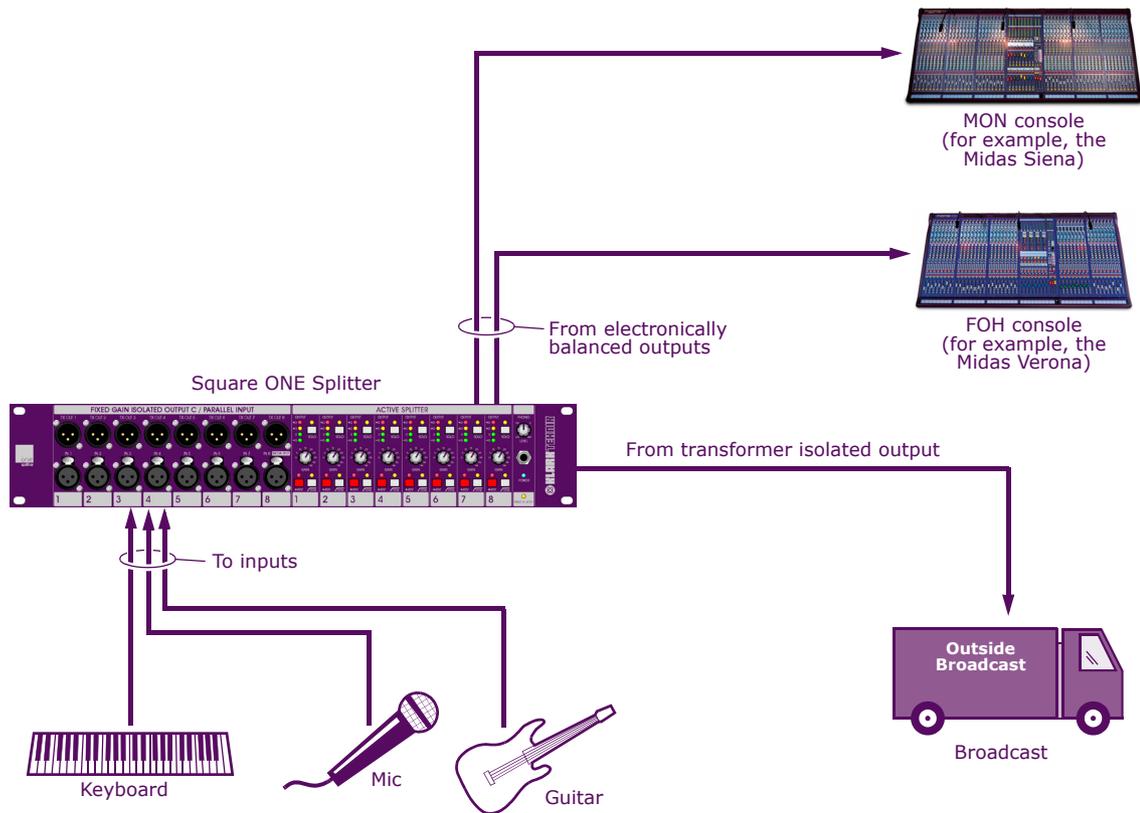


Applications

The following examples illustrate just a few of the many possible uses of the Square ONE Splitter in a live situation.

Example 1 - FOH and MON split, and broadcast out

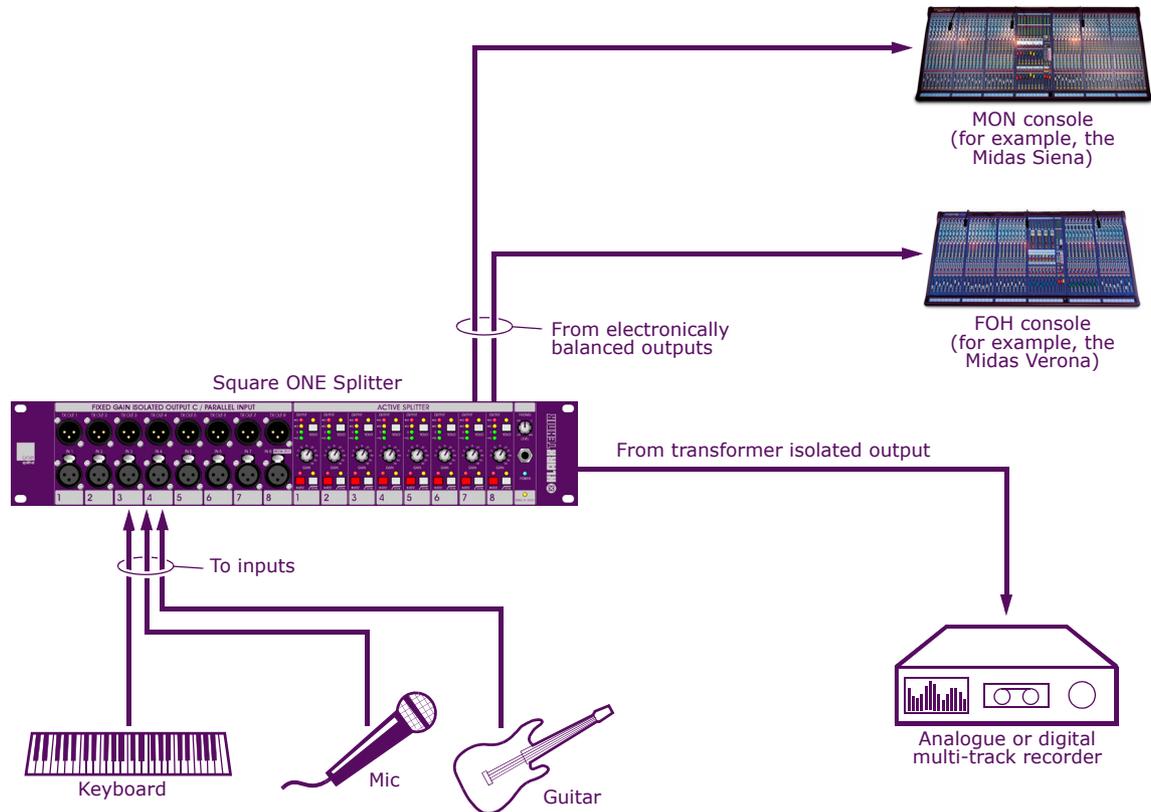
In a live broadcast situation, the Square ONE Splitter may be used to split the stage mic/line signals at source.





Example 2 - FOH and MON split, and recorder

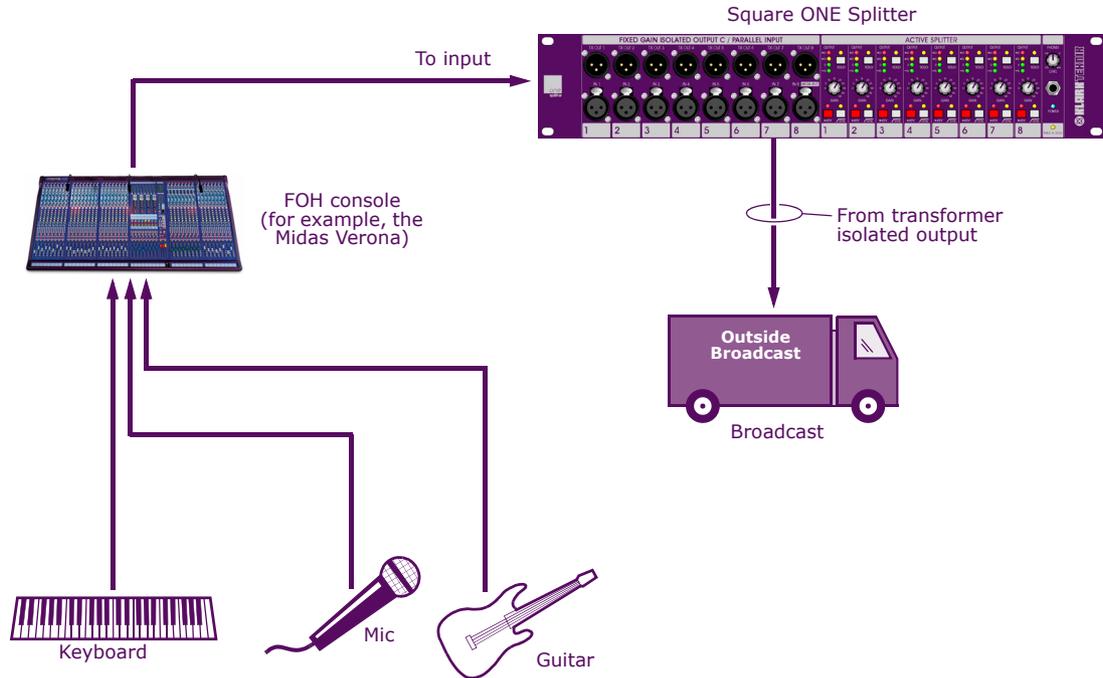
In this simple live situation the stage mic/line feeds are split to serve the FOH live sound console, a monitor console and an on-site recorder. It is recommended that the transformer balanced outputs are used to feed the recorder or recording console, especially if the grounding scheme is outside the control of the public address (PA) operator.





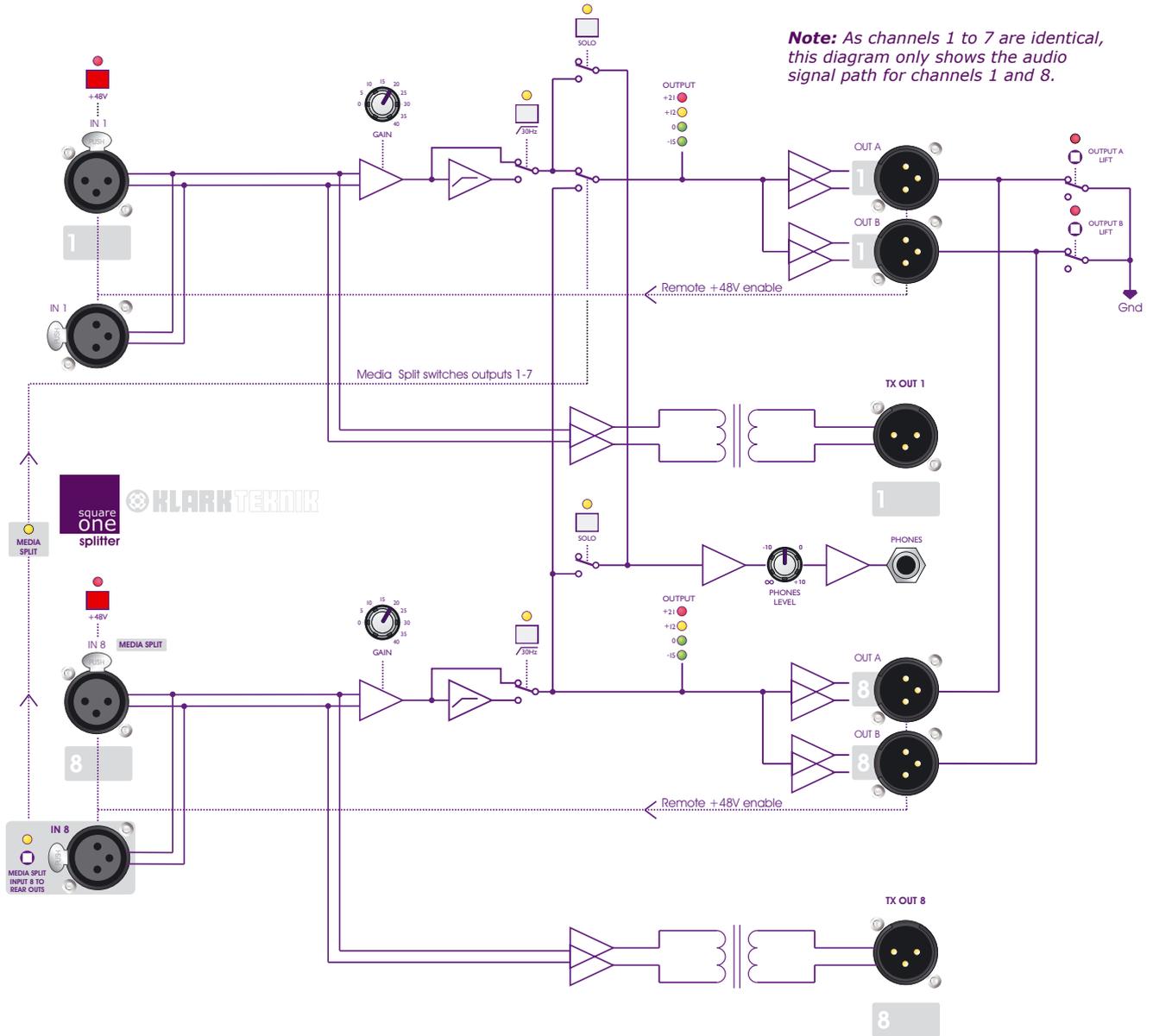
Example 3 - Pre-mixed broadcast output

In this live broadcast application the Square ONE Splitter provides isolated feeds from the group outputs of the FOH live sound console.





Audio signal path





Technical specification

Inputs	8 (mic/line)	Analogue, electronically balanced, female XLRs (Pin 2 hot)
	Type Maximum input level Input impedance Common mode rejection ratio (CMRR)	Analogue, electronically balanced, female XLRs (Pin 2 hot) +22dBu 5k ohms -80dB at 1kHz (typical), unity gain (0dB) -100dB at 1kHz (typical), maximum gain (+40dB)
Outputs	16 (rear panel)	Analogue, electronically balanced, male XLRs (Pin 2 hot)
	Type Operating level Maximum level Output impedance Signal drive capacity	Analogue, electronically balanced, male XLRs (Pin 2 hot) 0dB +22dBu <50 ohms <600 ohms
	8 (front panel)	Analogue, transformer isolated balanced, male XLRs (Pin 2 hot)
	Type Operating level Maximum level Output impedance Signal drive capacity	Analogue, transformer isolated balanced, male XLRs (Pin 2 hot) -6dB +22dBu <75 ohms <600 ohms
Headphone output	1 Type Rating	Analogue, TRS jack socket 750mW (nominal 50 ohm load)
Terminations	Audio	Front panel connectors Channel input: eight x AA series female XLRs (labelled "IN 1" to "IN 8") Isolated output C: eight x AA series male XLRs (labelled "TX OUT 1" to "TX OUT 8") Headphone output: one 1/4" TRS balanced jack socket
		Rear panel connectors Channel input: eight x AA series female XLRs (labelled "IN 1" to "IN 8") Electronic output A: eight x AA series male XLRs (labelled "OUT A") Electronic output B: eight x AA series male XLRs (labelled "OUT B")
	Power	3-pin IEC
Performance	Frequency response ¹ Distortion Dynamic range ²	±0.5dB (input to output), 20Hz to 20kHz <0.02% @ 1kHz, 0dBu at unity gain Electronically balanced outputs: >122dB* Transformer isolated outputs: >140dB*
	Noise floor ³	Unity gain <-100dBu* Mic EIN @ +40dB gain <-128dBu*
High pass filter	Filter frequency Filter slope	-3dB @ 30Hz 12dB per octave
Power Requirements	Voltage Frequency Consumption	100VAC to 240VAC ±10% 50Hz to 60Hz <35W



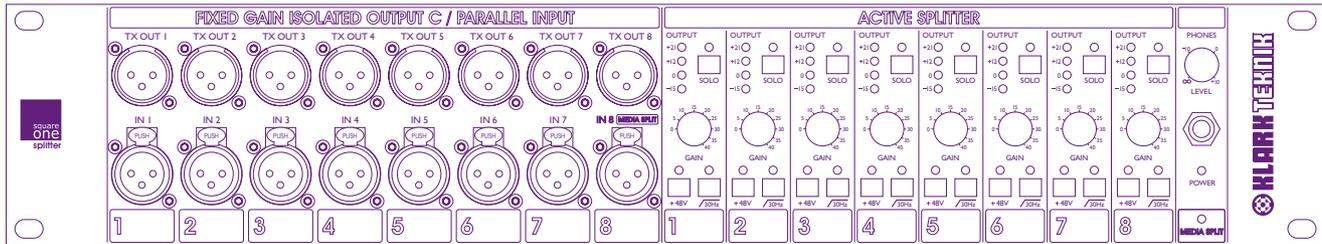
Dimensions	Height	88 mm (3.5"), 2U high
	Width	482 mm (19")
	Depth	200 mm (7 7/8")
Weight	Net	4.5 kg
	Shipping	5.7 kg

1. Measurement conditions: unit powered, all filters bypassed, unity gain and output terminated with 20k ohm balanced loads.
 2. Measurement conditions: unit powered, both inputs terminated with 150 ohms, all filters bypassed, unity gain set to 0dB and outputs terminated with 20k ohms balanced loads.
 3. Measurement conditions: unit powered, all inputs terminated with 150 ohms, all filters bypassed, outputs terminated with 20k ohms balanced loads.
- * 22Hz to 22kHz unweighted.

Due to a policy of continual improvement, Klark Teknik reserves the right to alter the function or specification at any time without notice.

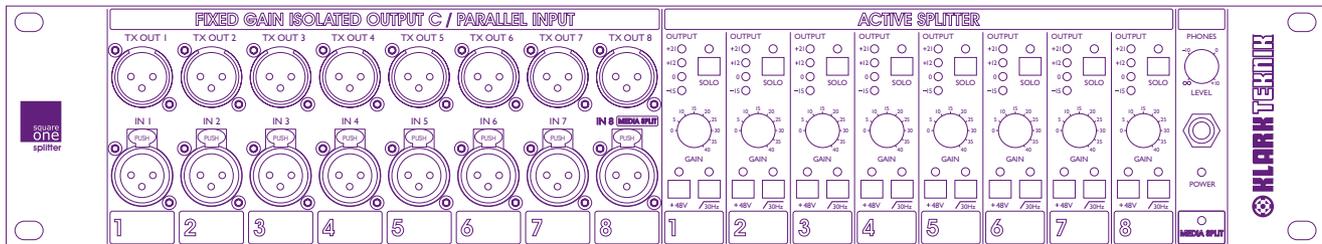


Crib sheet



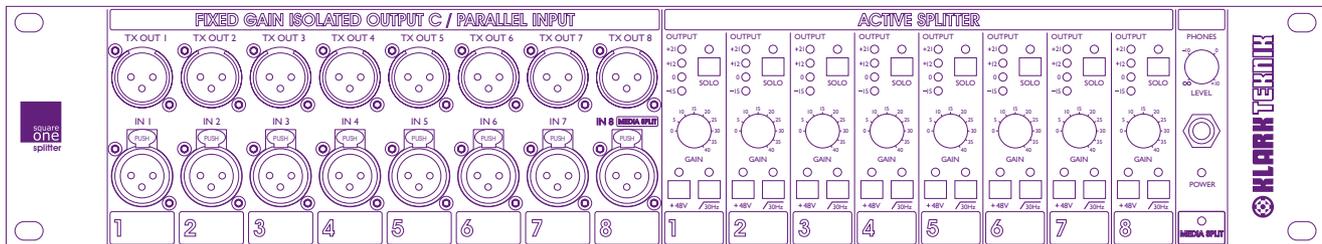
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More about splitters

This section is intended to provide some useful background information on mic splitters.

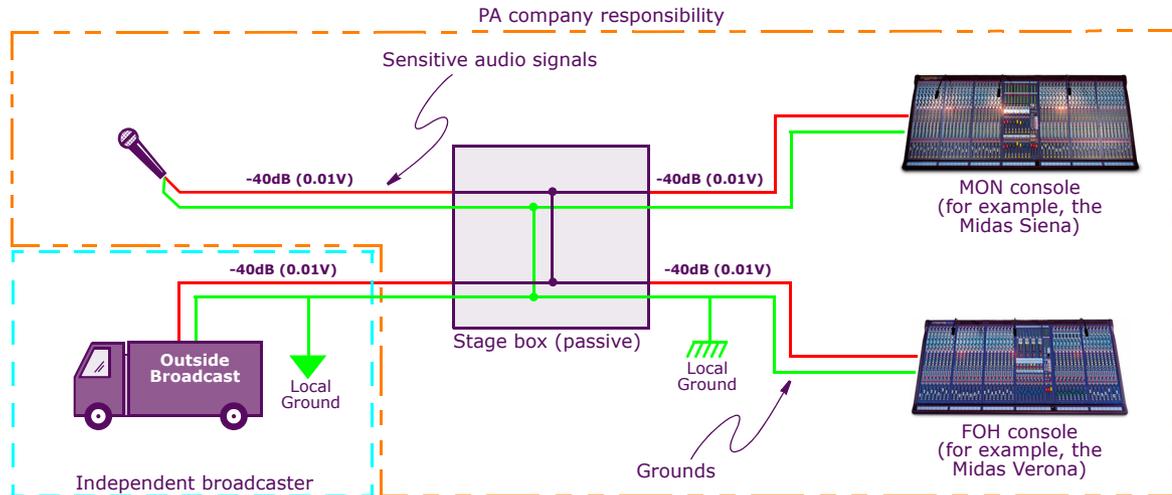
Introduction

In its very basic form, a splitter accepts mic/line signals and splits each signal for distribution to a number of different processing devices. However, more advanced solutions are required to cope with factors within a sound system that cause signal degradation and produce external noise and radio frequency (RF) interference. These factors include the number of splits required and the length of cable runs, and also the inherent problems imposed by the low level of the mic signal and multiple-grounding. The types of splitter and how they are designed to overcome these problems are discussed in further detail in the following subsections.



Passive parallel splitter

The passive parallel splitter has, basically, all of the 'split' points wired in parallel, offering no ground isolation or any gain stage whatsoever. Passive parallel splitters are popular at the lower end of the market as they provide a very cost-effective solution as compared with a transformer isolated splitter or an active splitter.



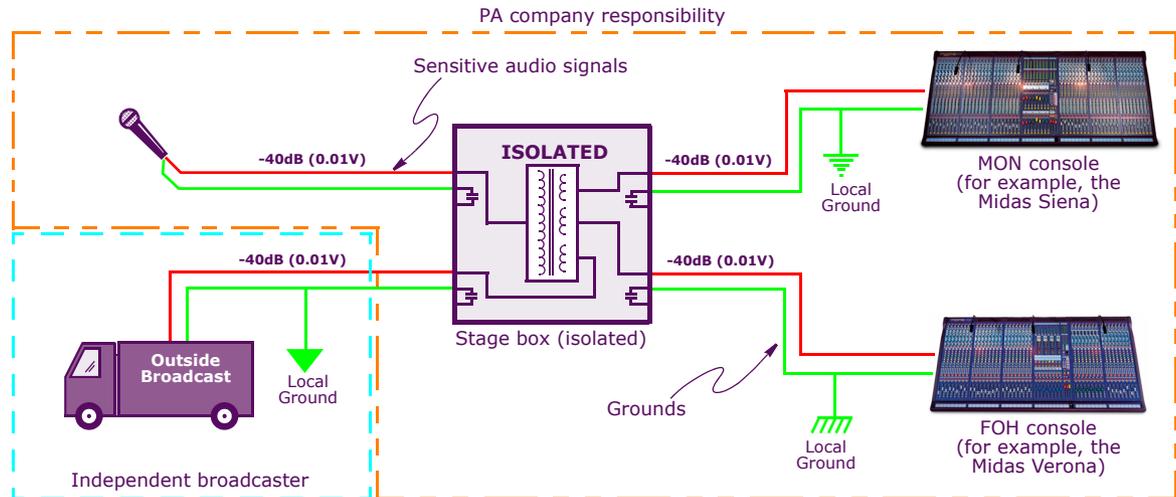
There are four fundamental problems inherent in a passive parallel type splitter:

- Mic signals are typically very low level (-40dB), with the gain being added at the mixing console. Due to the nature of a passive parallel splitter system the cable runs carrying the mic signal end up being quite long, increasing their susceptibility to picking up additional noise from other sources, for example, stray mains cables that may induce hum. In turn, this additional noise also gets amplified along with the original mic signal.
- The lengthy mic cable runs also significantly increase capacitance, which in turn reduces the high frequency content making the sound dull and uninspiring. Also, the input impedance of each console added to the system will reduce the overall level.
- Phantom powered mics are normally supplied via two $6\text{k}\Omega$ resistors. If additional $+48\text{V}$ sources are enabled in parallel this increases the current and voltage, potentially damaging the mic.
- The grounding regime is basically one complete ground with no option of isolating various parts of the system. This can potentially lead to ground loop problems if parts of the system are powered from different sources. For example, the PA company may have set the whole system up perfectly using one grounding regime, an independent broadcaster then arrives and has to use a portable generator, adding another grounding source.



Isolated splitter

An isolated splitter typically uses a 1:1:1:1 ratio transformer to achieve the audio isolation. The mic input signal is connected to the primary winding of the transformer, with all of the split points derived from the secondary windings. Additional 'ground lift' switches may be added to each of the split points providing the option to fully isolate individual parts of the system, if required.



Isolated systems are the next step up from a passive system and offer a big increase in performance, although this comes at a price. To get the best out of an isolated system a very high quality transformer is required, which is expensive.

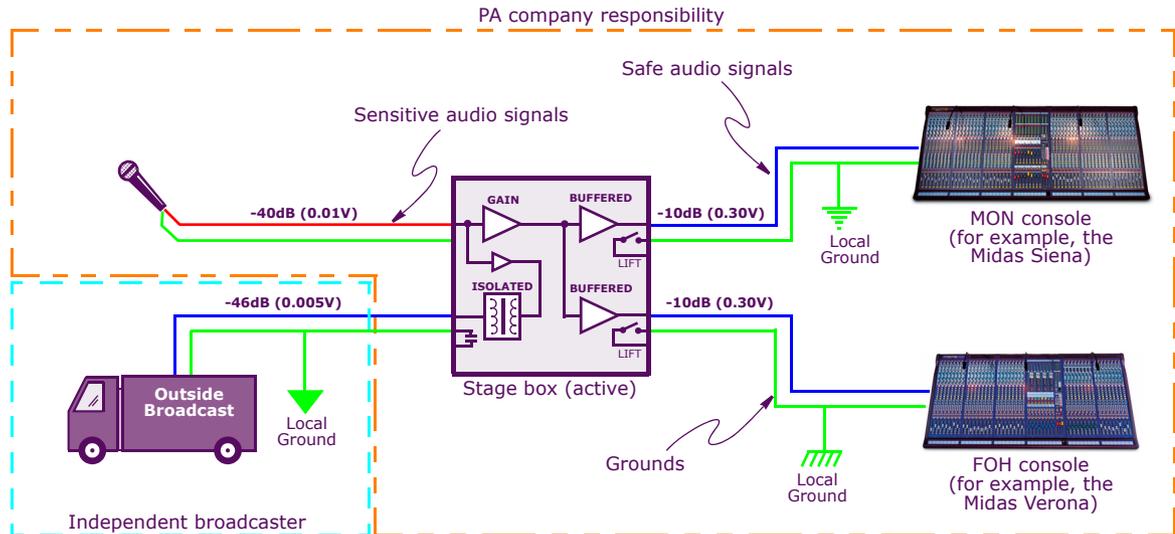
Although the isolated splitter addresses one of the fundamental problems inherent in passive systems by providing isolation, it doesn't solve the problem of sensitive low level mic signals being carried over long distances and their susceptibility to picking up additional noise from other sources, which is ultimately amplified at the mixing console. When using a 1:1:1:1 ratio transformer the loading on the mic and the extra capacitance remains, resulting in high frequency loss. Also, the input impedance of each console added to the system will reduce the overall level. There are 3:1:1:1 ratio 'step down' transformers available that compensate for the high frequency loss by lowering the gain.

Phantom power (+48V) will also need to be provided for the mics, which may entail connecting one of the consoles in a passive parallel splitter-type configuration or adding a separate supply.



Active splitter

An active splitter uses active electronic circuitry to address the problems inherent in passive (parallel and transformer isolated) splitter systems.



An adjustable gain stage is added at the front end of the split allowing the user to add a pre-determined amount of gain to the low level mic signal early in the system signal path. This is then buffered, electronically balanced and driven anywhere up to or at line level (making the signal relatively safe from external interference) before being sent on to the attached mixing consoles. This approach reduces the length of sensitive mic cables to a bare minimum, which dramatically improves audio performance by reducing cable losses and additional noise, and also keeps the mic loading normal, resulting in a far brighter and more accurate sound. Ground lift switches are provided on the electronic outputs to enable isolation, if required.

In addition, a transformer isolated output - normally derived as a copy of the post-preamp signal, but on the Square ONE Splitter is tapped off before the gain stage - is buffered and driven, making it relatively safe from external interference. This would typically be used for broadcasters who prefer to add their own gain and may also be running their system from a different power source.

Other useful features usually included with an active splitter - and especially on the Square ONE Splitter - are local metering, +48V phantom power and a solo system with headphone output to allow local monitoring.



Balanced audio

Balancing refers to the type of input or output signal connections in an audio system. These connections are specifically designed to reject external noise, for example, from mains wiring, and internal interference from adjacent signal cables. Unlike unbalanced lines, which are more susceptible to noise, balancing is especially useful when long cable runs are used between pieces of equipment and can also provide other benefits, including an increase in line signal level and a decreased possibility of ground loops. Balanced connections are typically employed on long cable runs, for example, to amplifiers, or for cables carrying sensitive or low level signals, for example, mics. A balanced line typically employs connectors of the XLR and 1/4" TRS jack plug types.

The basic principle of balanced interconnection is the cancelling out of any electrical noise by means of a three-cable connection to achieve the required signal. Two of the cables, called "hot" and "cold", are used to carry signals and the third is a grounded shield that surrounds the hot and cold cables. (An unbalanced connection only has two cables, one of which, the grounded shield, is also used for signal return.) As the hot and cold cables are of equal voltage (and the same source impedance) but of opposite polarity, when they are subtracted, any noise voltages - caused by interference and noise pick-up - appearing identically on both cables is cancelled out; the difference between them being the resultant signal.

However, in practice the electrical noise on both cables will never be identical, and the degree to which it is reduced is measured by the common mode rejection ratio (CMRR). The electronically balanced input and output connections of the Square ONE Splitter have the benefit of high common mode rejection (CMR), which eliminates externally induced interference such as mains hum etc. CMR is the ability of a balanced input to reject the part of the incoming signal that has the same amplitude and opposite phase on both input terminals, referenced to ground. As a specification, CMR is usually stated as a dB ratio, called CMRR, at a given frequency.

Note: On balanced circuits, the 'hot' signal is also known as "+ve" and "in phase", while the 'cold' signal is also known as "-ve" and "out of phase".



Service information

To help maintain your Square ONE Splitter unit in good working order and to make sure it gives you optimum performance, we recommend that you carry out the following procedures. Contact your local distributor if you require any further service information.

Routine maintenance

About once every month:

- Clean the unit, as detailed in "Cleaning the unit" on page 28.
- Check controls for freedom of operation; this operation may also help to prevent them from sticking.
- Check functionality of all controls, that is, pushbuttons, LEDs etc.
- Check functionality of equipment.

Cleaning the unit

Switch off the unit and electrically isolate it from the mains before cleaning.

Clean the unit using a dry, lint-free cloth. Do not use harsh abrasives or solvents. When cleaning the unit, take great care not to damage control knobs, pushbuttons etc.

Checking/replacing the mains fuse

The equipment must be independently isolated from the mains voltage supply before any attempt is made to change or check the protective fuse. The fuse must always be replaced and its drawer closed before the equipment is reconnected to the mains voltage supply.

Only use the correct replacement type when changing the fuse. Fuse specification is printed on the rear cover.

To remove the mains fuse, fully open the fuse drawer and prise out the fuse from the mains fuse compartment (see "Mains supply" on page 13). A small, flat-bladed screwdriver may be useful for this procedure. Check that the fuse is ok.

Insert new or existing fuse in the mains fuse compartment. If necessary, fit a new spare fuse. Close drawer.

After replacing a fuse, check that the unit is working properly.



KLARK TEKNIK
SIGNAL PROCESSING BY DEFINITION

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