CONFIGURATION MANUAL

ENGLISH

/ARM SYSTEM.®

SFX SAFETY

PART02323
rev 01-00

DISCLAIMER

Read this manual carefully before configuring an ARM SYSTEM and integrating the ARM SYSTEM into a complete SFX system. Failure to read the manual and to follow the instructions may lead to personal injury and/or property damage.

MAGIC FX reserves the right to modify specifications stated in this manual.

TRADEMARKS

Any brand names mentioned in this manual are registered trademarks of their respective owners. For improved readability, the product names in this manual are shortened, see Abbreviations.

LIABILITY

MAGIC FX accepts no liability for claims from third parties arising from unauthorised use, use other than that stated in this manual, and use other than in accordance with the General Conditions registered at the Chamber of Commerce.

MAGIC FX is not responsible for the implementation and validation of the overall safety system and safety plans at events. The system integrator that integrates the ARM SYSTEM into a complete SFX system for an event, is responsible for the overall system and system safety. The system integrator must make sure that the entire implementation complies with all relevant local, national and international laws and regulations, and that the system is tested and validated correctly.

We further refer to the General Conditions. These are available on request, free of charge.

Although considerable care has been taken to ensure a correct and comprehensive description of all relevant components, the manual may nonetheless contain errors and inaccuracies.

Should you detect any errors or inaccuracies in the manual, we would be grateful if you would inform us. This helps us to further improve our documentation.

TABLE OF CONTENTS

INTRODUCTION

This manual contains all information required for the correct configuration of the ARM SYSTEM. Deviation from the configuration instructions can result in a hazardous situation and/or property damage.

This manual includes general safety notes related to the configuration of the ARM SYSTEM and its integration into a complete SFX system at an event. For safety instructions related to the use and installation of the ARM SYSTEM components, refer to the user and installation manuals of the related component. Read all safety information of the ARM SYSTEM and its components attentively!

TARGET GROUP

This manual is targeted at qualified professionals in the event industry who are responsible for defining the configuration and application of the ARM SYSTEM, and integrating the ARM SYSTEM into a complete SFX system.

Qualified professionals are those who:

- Have skills and knowledge related to SFX applications for events and are trained in recognizing and avoiding the hazards involved.
- Are familiar with the safety instructions of each involved ARM SYSTEM component.
- Are familiar with the safety instructions of each involved SFX machine.
- Are familiar with and abide by the applicable local, national and international laws and regulations.

OTHER ARM SYSTEM DOCUMENTATION

Document	Document number
ARM CONTROLLER User and Installation Manual	PART01882
E-STOP User and Installation Manual	PART02291
BEACON User and Installation Manual	PART02059
COMBINER BOX User and Installation Manual	PART02293
COMBINER 19" RACK User and Installation Manual	PART02292

Other ARM SYSTEM documentation

ABBREVIATIONS

Abbreviation	Description
SFX	Special effects
DMX	Digital Multiplex
RDM	Remote Device Management
ARM SYSTEM	MAGICFX® SFX SAFETY ARM SYSTEM
ARM CONTROLLER	MAGICFX® SFX SAFETY ARM CONTROLLER
E-STOP	MAGICFX® SFX SAFETY E-STOP
BEACON	MAGICFX® SFX SAFETY BEACON
COMBINER BOX	MAGICFX® SFX SAFETY COMBINER BOX
COMBINER 19" RACK	MAGICFX® SFX SAFETY COMBINER 19" RACK
TERMINATOR	MAGICFX® SFX SAFETY TERMINATOR
DMX INJECTOR	MAGICFX® SFX SAFETY DMX INJECTOR
LABEL	MAGICFX® SFX SAFETY LABEL

Abbreviations

LANGUAGE

This document contains the original instructions in English. In case you require other languages please contact MAGIC FX.

REVISION TABLE

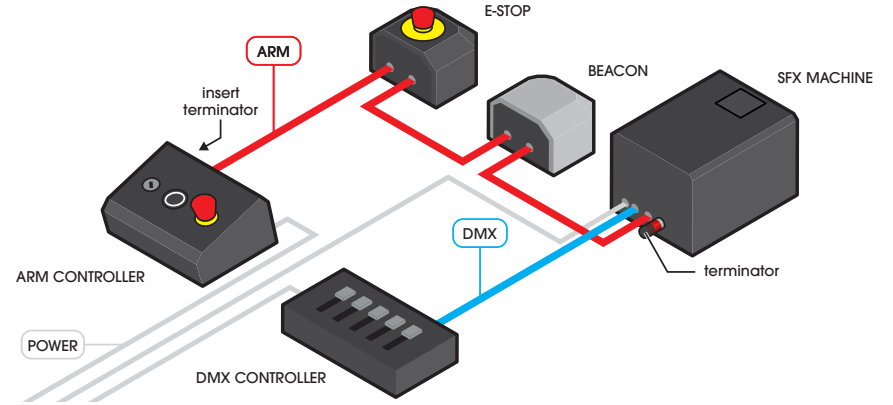
Doc nr	Revision	Date	Description	Author	Approved
PART02323	01-00	31-10-2022	Initial release	TF	PV

1 SYSTEM DESCRIPTION

1.1 GENERAL DESCRIPTION

The ARM SYSTEM is a manually operated safety system for ARM compatible SFX machines manufactured by MAGIC FX. The ARM SYSTEM consists of an independent safety circuit that connects SFX machines to an ARM CONTROLLER. The ARM CONTROLLER is equipped with a key switch, a reset button and an emergency stop button.

The ARM input and ARM output connectors on the ARM components and the SFX machines are used to create a looped circuit. The system is wired with EtherCON cables that carry the safety signal from the ARM CONTROLLER.



Example of a small ARM SYSTEM setup

1.2 WORKING PRINCIPLE

With its safety signal the ARM CONTROLLER operates one or more dedicated ARM relays in each connected SFX machine. When there's no signal, the ARM relays switch off the internal control circuits that produce the high-risk SFX output, e.g. flames. As a result, the system is 'disarmed' and the SFX machines cannot be operated. When the ARM CONTROLLER sends a signal, the ARM relays close the control circuits: The system is 'armed' and the SFX machines can be operated.

When an emergency occurs with one or more of the SFX machines, an operator will press the emergency stop button. The ARM CONTROLLER detects the interruption and directly cuts off the safety signal, disarming the system.

After actuation, the emergency stop button remains latched and actuated. To be

able to return to the 'armed' state and normal SFX operation, the operator must manually unlatch the emergency stop button, and perform a reset of the ARM SYSTEM.

INDEPENDENT OPERATION

The ARM SYSTEM is complementary to any other safeguards on the connected SFX equipment and does not replace the control for normal operation of the SFX machines, such as DMX or pyro. The ARM SYSTEM operates independently from the data and power supply to the SFX machines. As a result, all internal systems except for the ones that are responsible for the high-risk effect, remain powered in an emergency stop situation. Opposed to a safety system that switches off all power supply, this has the advantage that control data (RDM) in the SFX machines is not lost, and that the machines keep performing their normal operating tasks and checks.

SYSTEM EXTENSIONS

With the use of combiner devices that divide the safety circuit in multiple branches, you can create any ARM SYSTEM configuration to suit the setup of your SFX system. Furthermore, the ARM SYSTEM can be extended with additional control and signaling devices, such as an external emergency stop.

1.3 ARM SYSTEM COMPONENTS

Product name	Optional	Application	Product code
ARM CONTROLLER		Arm/disarm Emergency stop Reset ARM SYSTEM	MFX3220
E-STOP	x	External emergency stop	MFX3222
BEACON	x	Additional arm/disarm signaling	MFX3221
COMBINER BOX	x	Split ARM signal in two lines Boost ARM signal Combine DMX and ARM signal	MFX3225
COMBINER 19" RACK	x	Split ARM signal in multiple lines Boost ARM signal Combine DMX and ARM signal	MFX3224

ARM SYSTEM components

1.4 COMPATIBILITY

The ARM SYSTEM is only compatible with SFX machines that are manufactured by MAGIC FX, and that have EtherCON connectors for ARM input/output. If you're unsure if a machine is suited for safety control through ARM, please check the corresponding user and installation manual, or contact MAGIC FX.

1.5 ACCESSORIES

Code	Product
SPR90050	Key for FX-COMM4NDER and ARM CONTROLLER (pair)
MFX0313	Schuko to Neutrik ® powerCON TRUE1 - cable 1.5 m
MFX3223	MAGICFX® SFX SAFETY TERMINATOR
MFX3226	MAGICFX® SFX SAFETY DMX INJECTOR - cable 25 cm
SFX3201	MAGICFX® SFX SAFETY LABEL - size small 50 x 25 mm
SFX3202	MAGICFX® SFX SAFETY LABEL - size medium 75 x 50 mm
MFX0340	SFX SAFETY ARM Data cable (etherCON) - 1 meter
MFX0341	SFX SAFETY ARM Data cable (etherCON) - 3 meter
MFX0342	SFX SAFETY ARM Data cable (etherCON) - 5 meter
MFX0343	SFX SAFETY ARM Data cable (etherCON) - 10 meter
MFX0344	SFX SAFETY ARM Data cable (etherCON) - 15 meter
MFX0345	SFX SAFETY ARM Data cable (etherCON) - 20 meter
MFX0346	SFX SAFETY ARM Data cable coupler NEUTRIk

Accessories

1.6 SIGNAL STRENGTH

Similar to DMX, the ARM signal has signal loss due to resistance in the wire and in the equipment. The maximum number of attached devices is limited to 32 and a line of ARM (EtherCON) cables should not be longer than 300 meters. Use a combiner device to boost the signal if needed, see Section 3.3 'Combine, split and boost options'.

2 SAFETY NOTES

- Only use compatible machines, components and accessories.
- The ARM SYSTEM is dedicated to be integrated into a complete SFX system. Always perform a proper risk assessment of the complete SFX system and develop a risk reduction strategy for each event.
- Make sure that each ARM component and SFX machine in your SFX system is correctly installed in compliance with the instructions from the associated user and installation manuals from MAGIC FX.
- Make sure that you properly instruct all on-site personnel how they safely operate or interact with the ARM SYSTEM as configured for the event.
- Make sure that all on-site personnel who operate or interact with the ARM SYSTEM and the connected SFX machines, are familiar with the safety instructions of each component and machine.
- Make sure that the ARM SYSTEM is always tested and validated at the site before an event takes place.
- Make sure that the entire implementation including the ARM SYSTEM complies with all relevant local, national and international laws and regulations.

3 SYSTEM CONFIGURATION

This chapter will help you to design an ARM SYSTEM configuration that suits your SFX setup and risk reduction strategy. You will learn:

- How you divide your SFX setup in the necessary safety groups.
- Which control and signaling devices you need.
- How you can combine the DMX and ARM signal in one cable.
- How you can split the ARM signal in multiple lines.

For detailed schemes of example setups, refer to Appendix 1 of this document.

3.1 SAFETY GROUPS

Depending on the scale and complexity of your SFX setup and your assessment of the related risks, you must decide how many independent ARM SYSTEMs are required. Each of these safety groups will have their own ARM CONTROLLER and safety circuit. As a result, arm/disarm and emergency stop operations in ARM SYSTEM 'A' will not affect the SFX machines that are connected in ARM SYSTEM 'B'. Take note of the considerations below.

GROUP MACHINES BY LOCATION

Consider to divide your SFX machines into separate ARM SYSTEMs, depending on their location, for example a barrier line group and a stage group. When an emergency stop is pressed to stop or prevent a hazardous situation at the barrier line, only the SFX machines in the barrier line are stopped, and SFX machines on stage will continue to operate.

GROUP MACHINES BY OPERATOR

Consider to divide your SFX machines into separate ARM SYSTEMs, depending on the situation of the operator. An emergency stop operator might have a limited view on the SFX machines from their position. Configure your safety groups in such a way that operators only control the emergency stop for SFX machines that are visible to them, and/or add additional E-STOPs for assistant operators (spotters).

GROUP MACHINES BY EFFECT

Consider to divide your SFX machines into separate ARM SYSTEMs, depending on their role in your SFX setup. A logical approach is to create a separate ARM SYSTEM for each group of SFX machines that are identical and are operated simultaneously. For example, create a FLAMEBLAZER group and a STADIUM SHOT group. When an emergency stop is pressed to stop or prevent a hazardous situation with one of your FLAMEBLAZERs, only the FLAMEBLAZERs are stopped, and the STADIUM SHOTs will continue to operate.

3.2 CONTROL AND SIGNALING

ARM CONTROLLER

Each ARM SYSTEM has one ARM CONTROLLER, containing the arm/disarm key switch, a reset button and an emergency stop button. Always position the ARM CONTROLLER within reach of the main SFX operator. More than one ARM CONTROLLER in the same ARM SYSTEM circuit is not possible. However, you can add additional control and signaling devices in the ARM SYSTEM circuit: The E-STOP and the BEACON.

E-STOP

The E-STOP is an external emergency stop button that has the same functionality as the emergency stop button on the ARM CONTROLLER. Consider to add E-STOPs when your risk assessment shows that a single operator at the ARM CONTROLLER position is not sufficient. For example, when the view of the main SFX operator on a certain SFX machine is bad or blocked. Make sure that the E-STOP is within reach of a qualified assistant operator (spotter).

For examples of where to place E-STOPs, refer to the example setups in Appendix 1.

BEACON

The BEACON is a flashing signal light that warns any nearby personnel that the SFX machines are armed and ready to fire. Consider to add BEACONs when your risk assessment shows that personnel might accidently step into the safety zone of a SFX machine that's armed.

For examples of where to place BEACONs, refer to the example setups in Appendix 1.

3.3 COMBINE, SPLIT AND BOOST OPTIONS

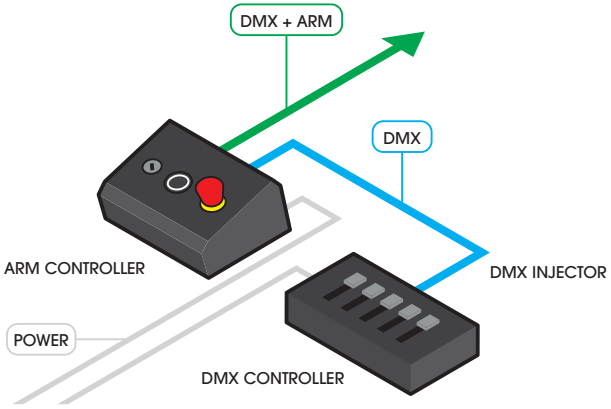
You can equip the ARM SYSTEM with components that can split and/or boost the ARM signal, or combine the DMX signal and ARM signal. Splitting the ARM signal into multiple lines helps you to create any desired ARM SYSTEM configuration. Combining the DMX signal and ARM signal will reduce the number of cables you need. Boosting of the ARM signal is required to overcome signal loss over long cable runs.

In many SFX setups, the DMX signal over XLR and the ARM signal over EtherCON will (partly) share wiring routes, thus connecting SFX machines in the same groups and order. In that case, you can reduce the number of cables needed by combining the DMX signal and ARM signal. The combined output runs over ARM data (EtherCON) cables.

Study each of the following components and accessories to learn about their capabilities.

DMX INJECTOR

The DMX INJECTOR is a dedicated cable that feeds the DMX signal into the ARM CONTROLLER. In the outgoing cable from the ARM CONTROLLER the DMX and ARM signal are combined.



DMX INJECTOR

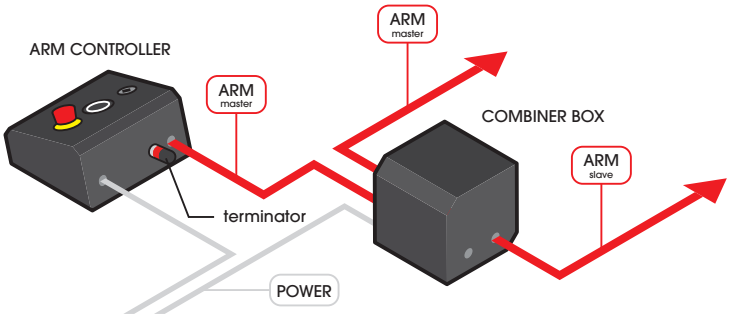
COMBINER BOX

The COMBINER BOX is a splitter and booster device for the safety signal of the ARM SYSTEM. The COMBINER BOX acts as a slave of the connected ARM CONTROLLER which is the master of the safety line.

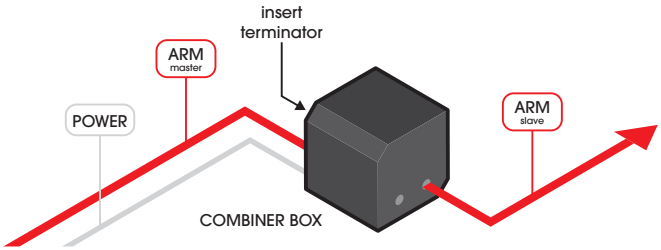
The COMBINER BOX is also capable of combining the ARM signal input with a DMX signal, into a DMX+ARM output. Furthermore, it provides a boosted output signal to overcome signal loss over long cable runs.

See the following configuration options.

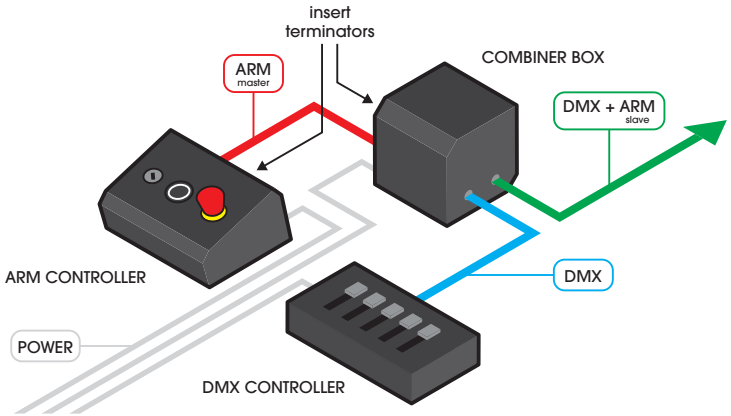
A Use the COMBINER BOX to split the ARM signal into a master line and a slave line. The slave signal is also boosted in this setup.



B Use a dedicated COMBINER BOX to boost the ARM signal.



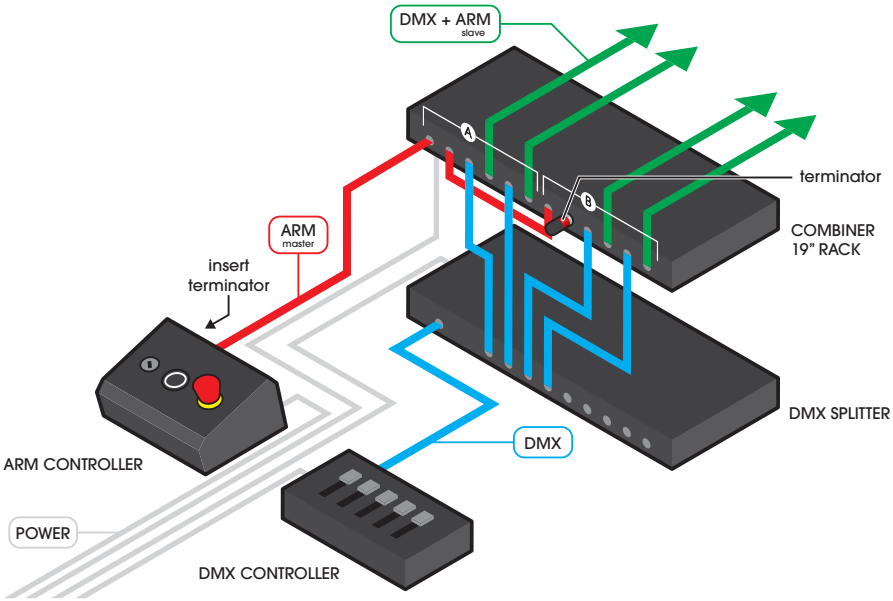
C Use the COMBINER BOX to combine the DMX signal and the ARM signal.



For detailed schemes of example setups, refer to Appendix 1 of this document.

COMBINER 19" RACK

Similar to the COMBINER BOX, the COMBINER 19" RACK can split and boost the ARM signal, and is capable of combining the ARM signal with a DMX signal. The COMBINER 19" RACK is equipped with four (2x2) outputs and is easy to combine with a DMX splitter.

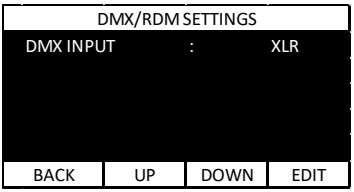


COMBINER 19" RACK | One ARM CONTROLLER and four DMX + ARM outputs

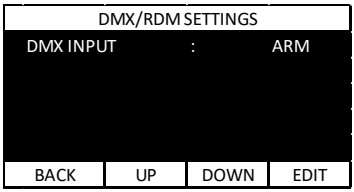
For detailed schemes of example setups, refer to Appendix 1 of this document.

3.4 SOFTWARE SETTINGS

Make sure that the DMX/RDM settings on each SFX machine matches your wiring setup. If the DMX signal runs separately over 5-pole XLR cables, make sure that XLR is selected as DMX INPUT in the menu. If a combined DMX and ARM signal runs over the ARM data (EtherCON) cables, make sure that ARM is selected as DMX INPUT in the menu.



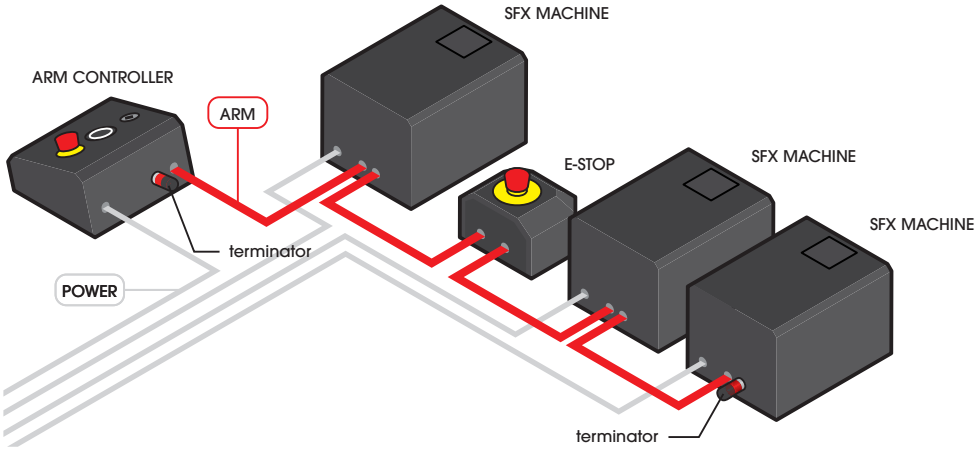
DMX signal runs separately over XLR cables



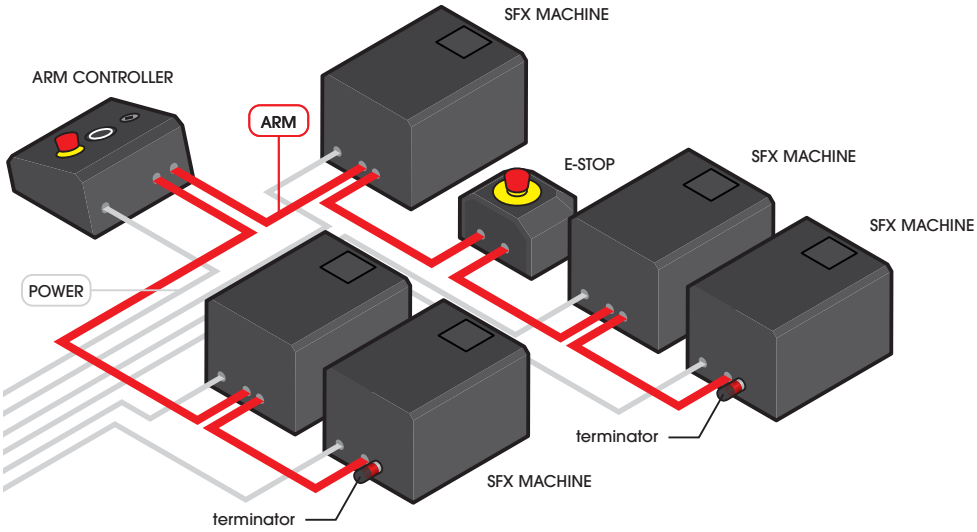
Combined DMX + ARM signal runs over ARM cables

3.5 CABLES AND TERMINATORS

The safety signal of the ARM SYSTEM is transported with EtherCON cables and flows in both directions. For a working ARM SYSTEM, terminators are required to create a loop at the end of each line.



Terminator example with one line from the controller

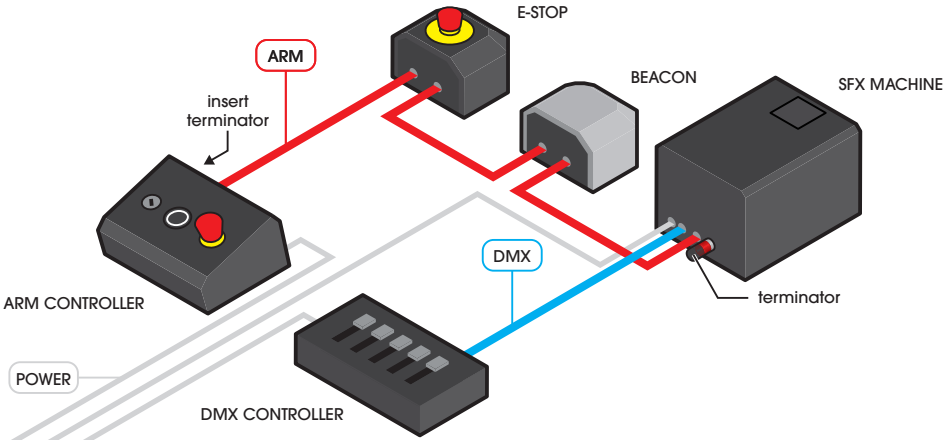


Terminator example with two lines from the controller

APPENDIX 1: EXAMPLE SETUPS

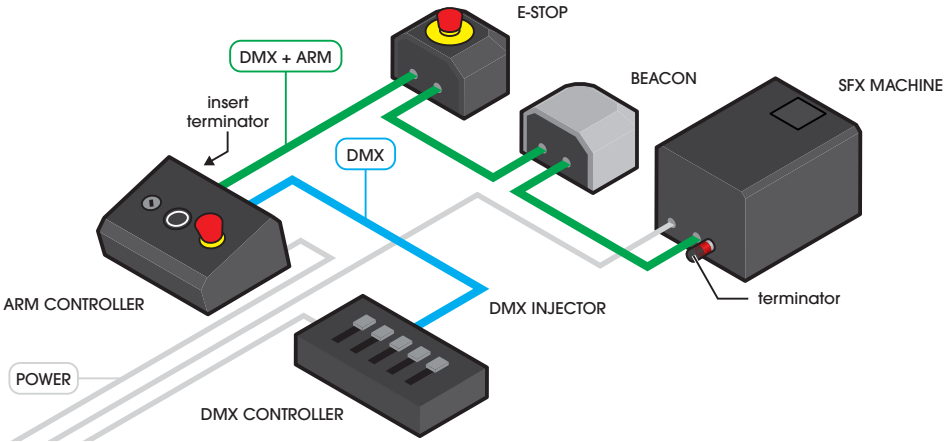
SETUP ONE

In this setup the DMX and ARM cables are separated. This makes it easy to add low risk SFX machines to the same control line. This setup also allows to position the ARM CONTROLLER close to the SFX machines.



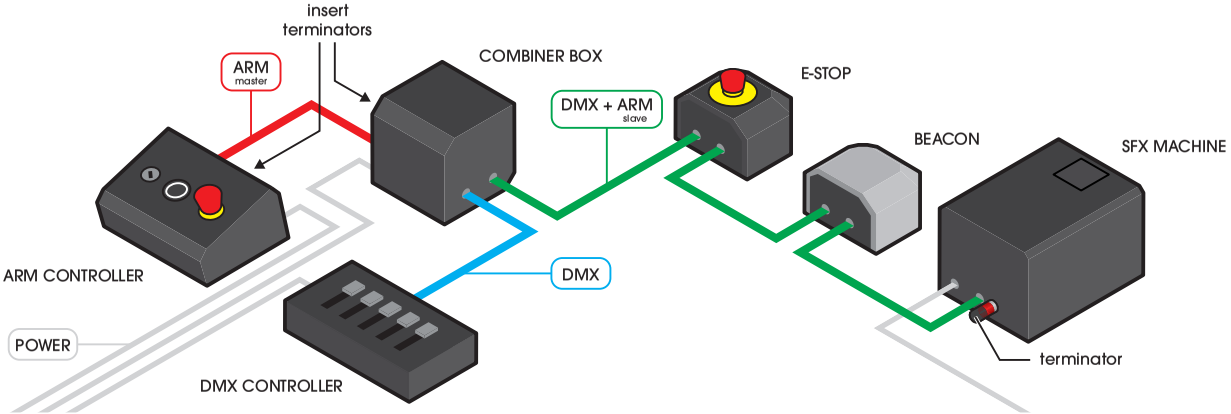
SETUP TWO

In this setup the DMX INJECTOR feeds the DMX signal into the ARM CONTROLLER. In the outgoing cable from the ARM CONTROLLER the DMX and ARM signal are combined, reducing the number of cables needed.



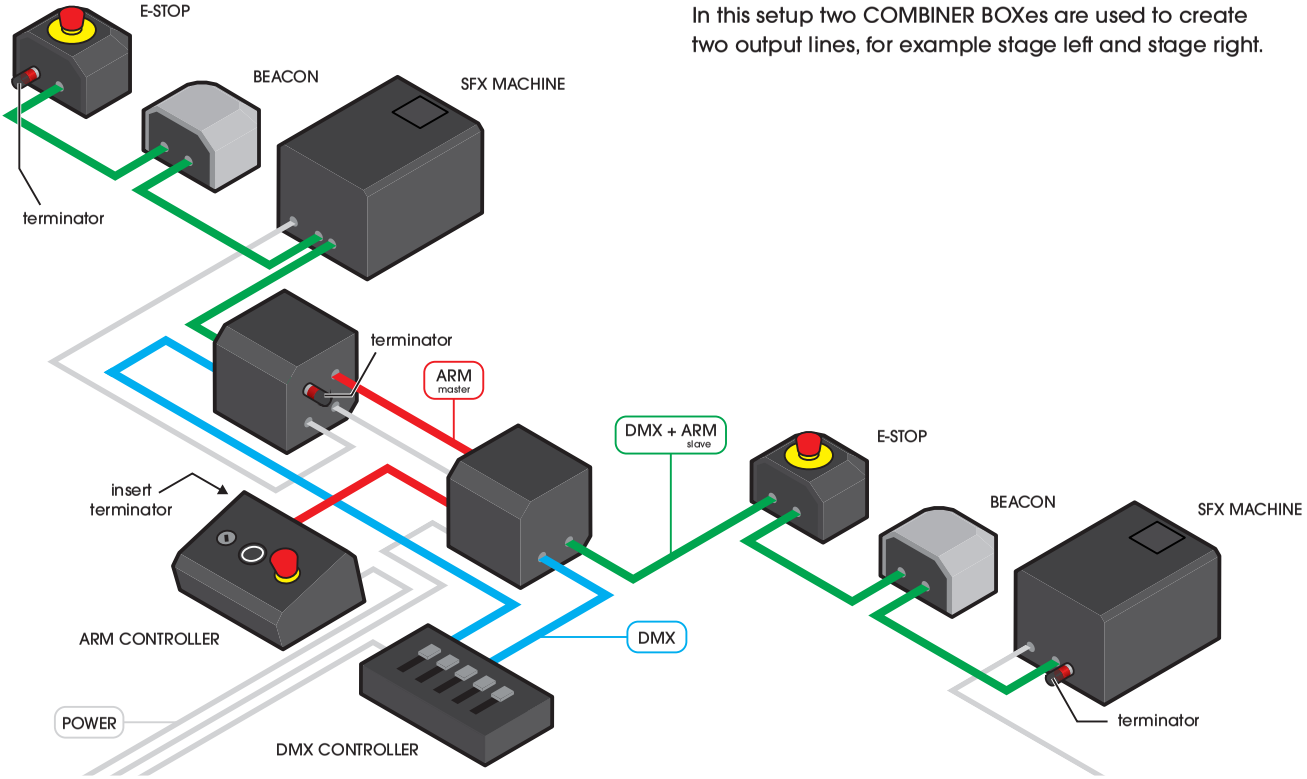
SETUP THREE

In this setup the COMBINER BOX combines the DMX signal from the DMX CONTROLLER and the ARM signal from the ARM CONTROLLER. In the outgoing cable from the ARM CONTROLLER the DMX signal and ARM signal are combined, reducing the number of cables.



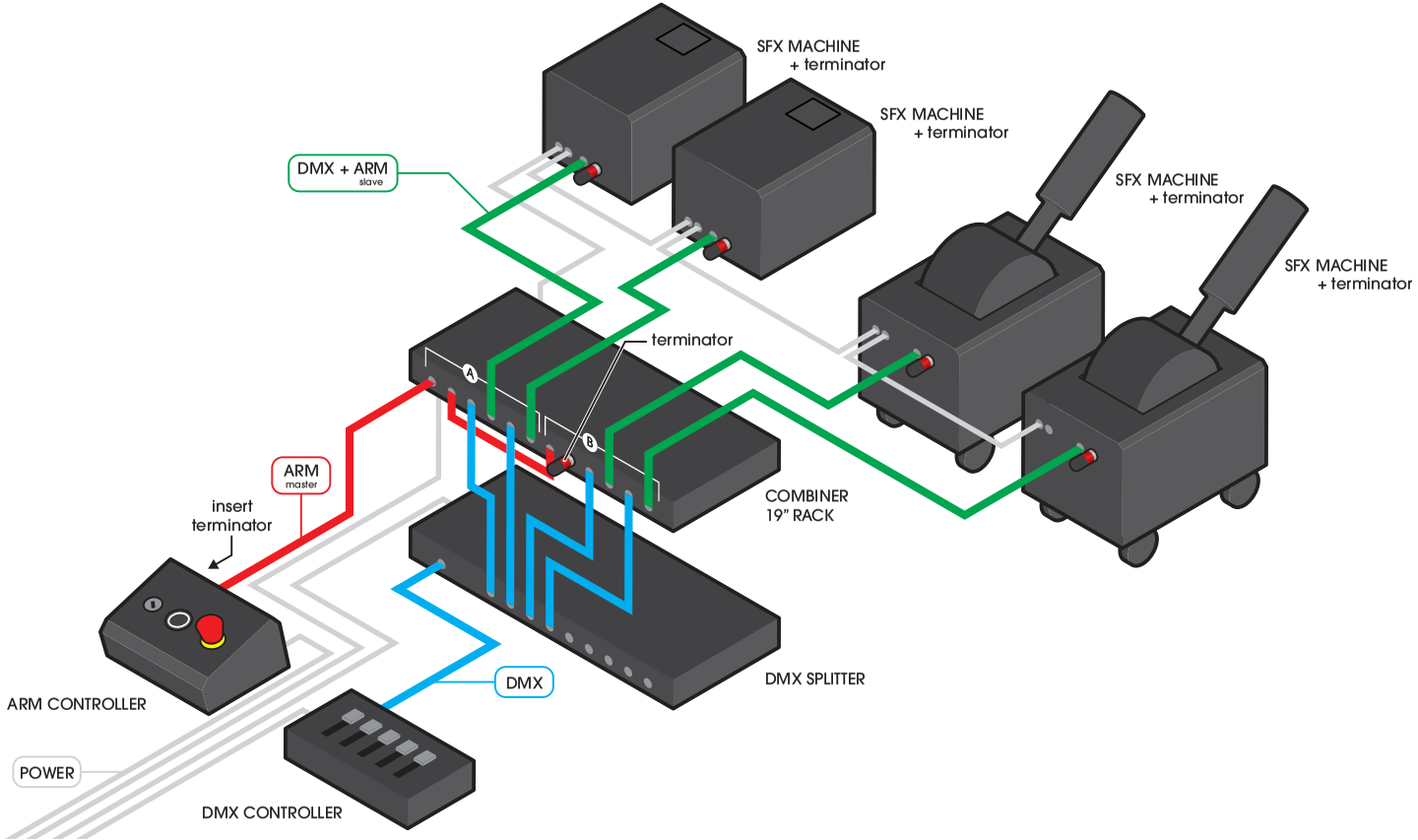
SETUP FOUR

In this setup two COMBINER BOXes are used to create two output lines, for example stage left and stage right.



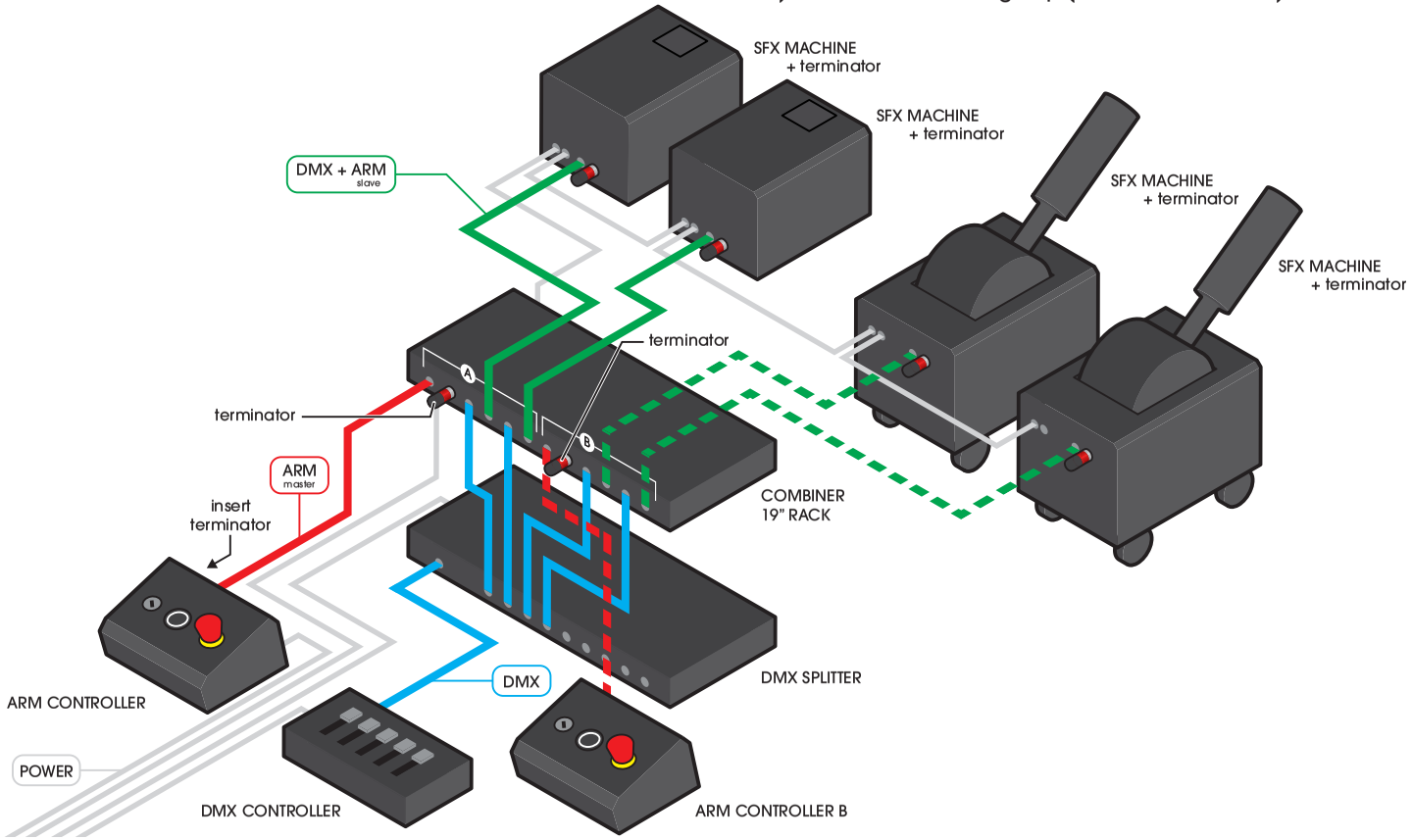
SETUP FIVE

In this setup a COMBINER 19" RACK is combined with a DMX SPLITTER to split the combined DMX and ARM signal in multiple lines for easy distribution.



SETUP SIX

This setup is similar to SETUP FIVE, but has a second ARM SYSTEM. This is applicable for a big setup that requires two SFX safety groups, for example a flames group (ARM CONTROLLER 1) and a stadium shot group (ARM CONTROLLER 2).



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