ALIEN TECHNOLOGY®

Nexus Multiplexor & Controller

ALX-2525

ALX-2530

User Guide

ALIEN

Nexus Multiplexor & Controller

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FCC Compliance
This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any change or modification to this product voids the user’s authority to operate per FCC Part 15 Subpart A. Section 15.21 regulations.

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1. Introduction

This manual provides safety information, technical support information, and sources for additional product information.

1.1. Who should read this manual?

This manual is written for personnel responsible for installing, configuring, and maintaining the **Alien Nexus Multiplexor & Controller**. This manual provides information about the features of the Nexus Multiplexor & Controller, and how to install, configure, operate, and maintain it.

Before operating Nexus Multiplexor & Controller, please read through and become familiar with the contents of this manual and also the Alien Reader Interface Guide.

It is assumed that the user is familiar with the use and operation of the Alien ALR-F800 series reader, has knowledge of the Alien Reader Protocol which is outlined in the Reader Interface Guide as well as having ability to communicate with the reader over Ethernet, Serial or USB Console ports.

Please refer to **8101938-000 GUIDE, READER INTERFACE, ALL FIXED READERS** for more detail on Alien Reader Protocol commands, functions and features.

1.2. Introduction

The Alien Nexus Multiplexor & Controller is an RF antenna multiplexor (MUX) that enables one RFID reader antenna port to interface with up to 8 antennas, increasing the total number of antennas and also RFID coverage available from a single RFID reader.

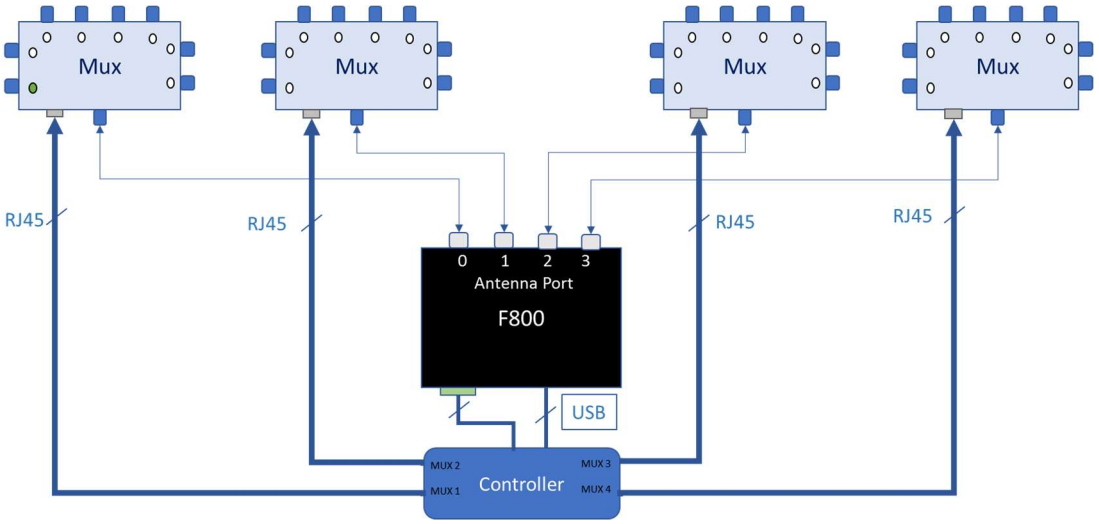
The Nexus Multiplexor & Controller are plug-and-play compatible with all Alien F800-series fixed readers utilizing standard command set.

2. Hardware Setup

Multiplexors, **ALX-2525**, receive control signals and power from the MUX controller, **ALX-2530.** The MUX controller sources power from either the ALR-F800 series reader USB Host port, the ALR-F800 GPIO +12VDC pin #15 or an external power supply. Power source is determined by jumper inside of the MUX controller.

2.1. Block Diagram

The physical interface between controller, MUX and reader is depicted in the example below:



2.2. Setting MUX Controller Power Source

2.2.1. There are 3 ways to power the MUX controller as down the table below:

Options	F800 Power	GPIO DB15 Cable	USB Cable	Ext AC/DC Power Supply
USB +5V	PoE or AC/DC*	Required	Required	N/A
GPIO +12V	AC/DC*	Required	N/A	N/A
Ext 6-24V	PoE or AC/DC*	Required	N/A	Required

* To comply with FCC requirements, you must use Alien Model ALX-xxxx power supply or add Alien Model ALX-yyyy ferrite to your existing Alien Model ALX-

2.2.2. Power connection options include:

- USB — Connect the ALR-F800 to the MUX Controller with a Type A to Type A USB cable. Power the reader from PoE or the Alien supplied AC/DC power adapter
- GPIO +12 VDC — Power is provided to the MUX Controller from the reader GPIO port through the GPIO DB15 Cable. The reader must be powered by the Alien supplied AC/DC power adapter.
- External — Connect the output of the user supplied DC power supply (6 – 24 VDC) to the MUX Controller V IN and GND of the green connector.

2.2.3. Default power settings and procedure to change

The MUX Controller default power setting is USB +5 VDC. To change Controller power source setting, open the Controller case by removing the 4 screws holding case together. Select the jumper for desired power source.

3. Connecting the System

The following procedure outlines how to connect the MUX and Controller to F800-series readers.

3.1. Plug the supplied **F800 GPIO to DB15** adapter into the **F800 GPIO** port
3.2. Plug the supplied **GPIO DB15 cable** into the **MUX GPIO to DB15** adapter and **DB15** connector of the MUX Controller
3.3. If operation from 5V USB is required, plug the supplied USB cable into the F800 USB port and into the Controller USB port
3.4. Connect a RF coax cable between desired F800 antenna port and the MUX **RF IN** connector
3.5. Connect the MUX units to the Controller using standard (non-crossover) Ethernet patch cable as follows:
  3.5.1. MUX connected to F800 Antenna Port 0 ➔ MUX Controller **MUX 1**
  3.5.2. MUX connected to F800 Antenna Port 1 ➔ MUX Controller **MUX 2**
  3.5.3. MUX connected to F800 Antenna Port 2 ➔ MUX Controller **MUX 3**
  3.5.4. MUX connected to F800 Antenna Port 3 ➔ MUX Controller **MUX 4**
3.6. Connect antennas to **MUX RF Ports (Ant 0-7)** using appropriate RF coax cables
3.7. Connect Power to the Reader. Power connection may be PoE or DC power source.
  3.7.1. PoE connection: Connect Ethernet cable between PoE Power Sourcing Equipment and F800
  3.7.2. DC connection:
    3.7.2.1. Verify the DC supply includes a ferrite. If it does not, install the required ferrite (available from Alien) as follows"
      - Open the hinged ferrite
      - Place dc connector against one edge of the ferrite
      - Wrap three turns of the DC lead around the ferrite
      - Snap the ferrite closed
    3.7.2.2. Ensure AC Plus is **DISCONNECTED**
    3.7.2.3. Connect the DC power jack to F800 and tighten locking collar
    3.7.2.4. Connect the power supply AC plug to AC power adapter
3.8. User **serial** or **network** interface to communicate with reader
3.9. Connect earth ground to the reader. The earth connection to the reader can be made by mounting the reader on a grounded surface or connecting a ground wire using the reader mounting features.

4. Mux Controller GPIO Interface

There are 4 inputs and 2 outputs available to the user on the MUX Controller GPIO Connector. The MUX Controller provides its power source at the **V OUT** pin of the GPIO connector for use by external GPIO circuits.

4.1. Inputs: GPIO inputs of the MUX Controller are directly connected to the F800 inputs. External input circuits may be connected between **V OUT** and **IN 0-3**.

4.2. Outputs: GPIO outputs of the MUX Controller GPIO Connector are directly connected to the F800 outputs. External output circuits can be connected between **V OUT** and **OUT 0** or **OUT 1**. External output circuit current draw must be limited in accordance with the specification, otherwise the system may limit the current, reboot the reader and/or may cause damage.

5. Reader Commands

The following standard Alien Reader Protocol (ARP) commands may be used to configure and operate the MUX:

5.1. **AntennaSequence**: This command specifies a sequence of up to 32 antennas to be used by the reader. The allowable values are as follows:

```
0-3     Use these if antenna is connected directly to the F800antenna ports (ANT 0-3)
10-17   ANT0-7 of Multiplexer 1 connected to F800 ANT0 port
20-27   ANT0-7 of Multiplexer 2 connected to F800 ANT1 port
30-37   ANT0-7 of Multiplexer 3 connected to F800 ANT2 port
40-47   ANT0-7 of Multiplexer 4 connected to F800 ANT3 port
```

5.2. Antenna initialization is performed when the **AntennaSequence** command is issued. Antennas must be physically connected prior to issuing the **AntennaSequence** command.

AntennaSequence Examples	
Command Response	Alien> AntennaSequence? AntennaSequence = 0
Command Response	// use F800 antenna 1 (connected to F800 reader port ANT1) Alien> AntennaSequence = 1 AntennaSequence = 1
Command Response	// use F800 antennas 0 and 1 (connected to F800 ports ANT0 and ANT1): Alien> AntennaSequence = 0 1 AntennaSequence = 0 1
Command Response	// use all antennas of MUX1 connected to F800 port ANT0 Alien> AntennaSequence = 10 11 12 13 14 15 16 17 AntennaSequence = 10 11 12 13 14 15 16 17
Command Response	// use F800 antenna 0 connected to F800 port ANT0 and all antennas of MUX2 connected to F800 port ANT1 Alien> AntennaSequence = 0 20 21 22 23 24 25 26 27 AntennaSequence = 0 20 21 22 23 24 25 26 27