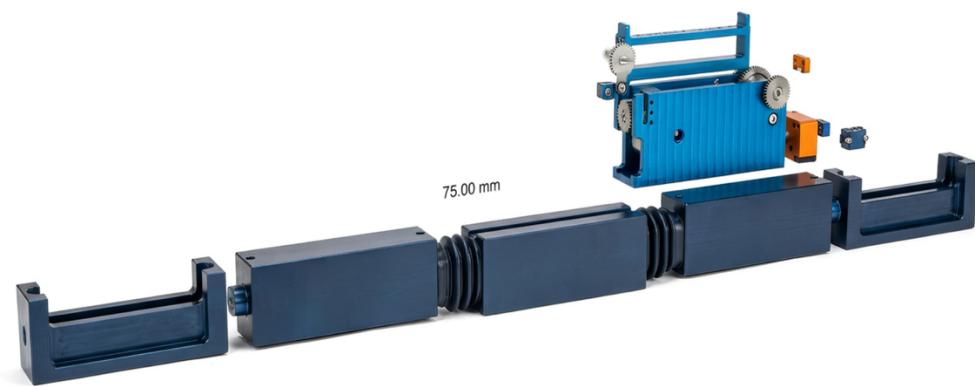


ASSEMBLY MANUAL

Crosier Control



Diseño y desarrollo de sistemas MMHCI híbridos con bioseñales y un DMI de smartphones, para obras bio-interactivas mixtas y performáticas

Pure Data Manual for the PhD Thesis: Juan Pablo Posada Alvarez

DMI Crosier-Control Assembly Manual

3D Model and Physical Prototype

1. Introduction

This manual describes the physical assembly process of the **DMI Crosier-Control (Digital Musical Instrument)** from its three-dimensional models developed in Autodesk Fusion 360 and the corresponding 3D printed components. This instrument has been conceived as a **mobile control surface**, oriented to multimodal interaction in performance and artistic research contexts, simultaneously integrating **haptic and non-contact interaction**, as well as three-dimensional displacement and orientation capabilities.

The design of the Crosier-Control responds to a modular approach, which allows multiple structural and functional configurations, adaptable to different contexts of use, bio-interactive works and human-machine interaction systems (MMHCI). The assembly described in this document corresponds to the base model of the instrument, used during the experimental validation and development phases of the Crosier-Control-Data system in the Pure Data environment.

2. General Hardware and Software Considerations

The hardware design of the Crosier-Control is based on a segmented longitudinal structure, capable of accommodating **two smartphone devices** that function as sensing and distributed processing units. The sensors integrated in each smartphone (accelerometers, gyroscopes, touch screens and computing capabilities) meet the technical requirements of the interaction system. Each mobile device requires the installation of specific applications, selected according to the parameters of use and the particular needs of each bio-interactive work. Data management, interaction algorithms and communication with music processing environments are carried out using the **Crosier-Control-Data** module, developed in the **Pure Data environment**.

For the validation tests of the Crosier-Control system, a multimodal environment was used that included the **Pure Data**, **Ableton Live**, and the **Crosier-Control-Data** module itself, allowing the evaluation of the behavior of the instrument in real performance situations.

3. System Components

The modular design of the Crosier-Control consists of **four main structural components**, conceived as interchangeable units:

- **Terminal modules (A1 and A2):**

Specifically designed to house smartphone devices. These modules define the ends of the instrument and are not interchangeable with each other.

- **Intermediate modules (B and C):**

Structural segments that allow the total length of the instrument to be extended or modified. These components can be combined freely and in any order, without affecting the functionality of the system.

This modular approach allows the physical dimensions of the DMI to be adjusted according to the performative, ergonomic or spatial needs of each context.

[Space for Figure 1: General Schematic of the Crosier-Control DMI Components]

4. Structural Assembly Process

4.1 Configuring the intermediate modules

Assembly begins with the selection of the intermediate modules (B and/or C), depending on the desired length of the instrument. These components are coupled using a **standard thread system**, ensuring a firm and stable joint, with no restrictions on the order of assembly.

The system allows for various dimensional configurations, from minimal to extended configuration by incorporating multiple intermediate segments.

[Space for Figure 2: Assembly of intermediate modules by thread system]

4.2 Incorporation of the terminal modules

Once the intermediate modules have been assembled, the terminal modules **A1 and A2** are incorporated, which are fixed at the ends of the structure. These modules fulfil a double function: structural and functional, as they contain the cavities specifically designed to house smartphone devices.

The **minimum operating configuration** of the instrument is obtained by combining an intermediate module (B or C) with a terminal module (A1 or A2). However, for complete performative applications, the use of both terminal modules is recommended.

[Space for Figure 3: Complete assembly schematic of the Crosier-Control DMI]

5. Installing the smartphone devices

The final phase of physical assembly consists of the installation of the mobile devices inside the terminal modules. Each smartphone is inserted into its corresponding cavity, designed from the 3D models to ensure a precise fit and correct alignment of the device.

Once positioned, smartphones are secured using **fastening covers and bands with a Velcro-type grip system**, which ensures a firm hold without compromising the accessibility or integrity of the device.

This fixing system allows for quick and secure installation, also facilitating the replacement or reconfiguration of devices when necessary.

[Space for Figure 4: Installing Smartphones in Terminal Modules][Space for Figure 5: Finished Assembly of the Crosier-Control DMI]

6. Final Adjustments and Verification

Once the assembly is complete, it is recommended to verify:

- The mechanical stability of all screw connections.
- The correct attachment of mobile devices.
- The general alignment of the instrument.
- The absence of slack or unwanted displacement.

After this verification, the Crosier-Control DMI is ready for connection with the **Crosier-Control-Data** module and for use in test, test or performance contexts.

If you want, in the next step I can:

- adapt this manual exactly to the Word format (styles, numbered titles)
- or help you explicitly link this manual to the f3D files and section A.8.3 of the repository

