

# PacketFlux SyncPipe for Canopy

## Installation Instructions

03 April 2006 Revision

### Introduction

The PacketFlux SyncPipe for Canopy has been designed to receive a high accuracy timing signal via GPS technology and provide that signal to Motorola Canopy Access Points and BackHaul Radios.

This timing signal is designed to be fully compatible with existing Motorola timing devices. This signal can be provided to the radio either via direct connection to the radio's timing port or via a PacketFlux SyncInjector.



This document assumes that you will be connecting the SyncPipe to the radios via the timing port. If you are using the SyncPipe with a PacketFlux SyncInjector to provide timing via the Power port, you should refer to the manual for the PacketFlux SyncInjector instead of this document.

### About the Case

Yes, it is, in fact, really, a piece of Schedule 40 PVC plumbing pipe with a standard pipe cap on top and a rubber “cleanout cap” on the bottom. When designing the SyncPipe, we were concerned about durability, ruggedness, and cost. We evaluated our options for a custom case and simply could not find anything which was as durable which we could purchase for a reasonable per-unit cost. Because our goal was to provide a timing solution for the Canopy product which didn't cost an arm and a leg to acquire, we decided that the PVC pipe solution was the ideal solution for us and our customers. Because this is stock PVC some labels may remain.

### Mounting

When you get ready to mount the SyncPipe, the first thing you will

probably notice is that we didn't include any mounting hardware with the device. This is intentional. We thought long and hard about what, if anything, to include with the device and after much deliberation we came back to the fact that no matter what we included it would be wrong for a large portion of our customers.

The SyncPipe needs to be mounted where it has a clear view of most of the sky. The ideal situation is full 360° visibility from horizon to horizon. A full 360\* coverage is not completely necessary. Partial blockage from a tower or other similar object will not significantly affect the quality of the timing signal received. If given a choice (and full 360\* coverage was not available), a clear view of the southern half of the sky is preferred due to the location of geosynchronous GPS satellites which provide a correction signal to help improve the accuracy of the 1 PPS timing signal. (If you're in the southern hemisphere, then the northern sky is preferred).

Positioning on the tower (or other structure) is also important. We recommend you keep any cables carrying timing signals as short as possible. When synchronizing radios via the timing port, the SyncPipe should be mounted fairly close to the radios it will be providing timing to. However, if you intend in the future to utilize a SyncInjector, you should strongly consider mounting the SyncPipe closer to the enclosure or building where you will be installing the SyncInjector, since the timing signal will need to travel from the SyncPipe to the SyncInjector where it is utilized to provide the Synchronization signal.

We also would recommend that you keep the SyncPipe away from strong RF sources. This includes things like two-way radio repeaters, paging transmitters, AM and FM transmitting antennas, and similar. We don't consider canopy radios strong RF sources. The reason for this recommendation is that strong RF can distort the timing signals and cause synchronization problems. If the RF is strong enough, it can even prevent the GPS receiver within the SyncPipe from working at all. You should also be careful when routing cables to avoid these strong sources since the RF can corrupt the signal within the cables.

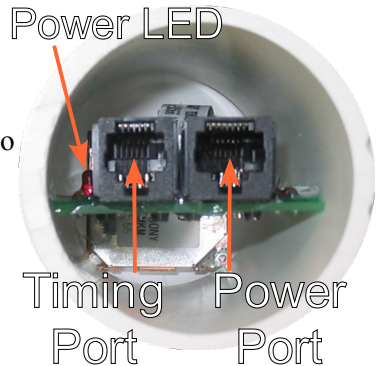
After you have determined where to mount the SyncPipe, you will need to figure out how you intend to mount it. One simple method is to just use a hose clamp to attach it to a mast of some sort. If you

happen to be mounting the SyncPipe on a building, you may want to consider just using a standard satellite dish mounting arm and use a hose clamp to clamp the SyncPipe to the top of the arm. If you are mounting to a tower, you can do something similar with a mast attached to some offset brackets.

Regardless of the method you use, we would recommend that you try to mount the SyncPipe such that any metal used to mount the SyncPipe does not extend above the sides of the top cap. Because the GPS antenna is within the rounded top of the cap, any metal nearby **may** negatively affect the reception of the GPS timing signal.

## Cabling

Like mentioned above, all cables should be as short as possible. We developed the SyncPipe for use with cables up to 300 feet. That said, we do not recommend you use 300 foot (or longer) cables unless you absolutely have to, since the longer the cable, the more likely you are to have timing problems.



When cabling, follow the following rules:

- 1) Use the shortest cables possible.
- 2) Use high quality category 5 cables. Follow standard wiring procedure. For the cable plugged into the power port of the SyncPipe, wire the cable using standard EIA/TIA-568A or B wiring. For the cables for the timing port, wire the cable according to the diagram in the Motorola Canopy manual.
- 3) Relocate the SyncPipe if needed to keep cables short.
- 4) Shielded cable is recommended for longer runs. If shielded cable is used, tie the drain or shield to a good earth ground at one end.
- 5) Having too long of cables may cause timing issues due to crosstalk and inductance from other signal sources.
- 6) Did we mention that short cables are good and long cables are bad?

To use the SyncPipe, you will need to run two cables. The first is a standard Category 5 cable (kept as short as possible) with RJ45 plugs on both ends. This cable will connect the power injector to the SyncPipe. The second should also be a category 5 cable with 6 Pin RJ11-style (6P6C) connectors on both ends, wired as per the Canopy instruction manual. This cable will connect the timing port on the SyncPipe to the timing port on the radio to be synchronized. Double check the connections on all cables. In some cases, a mis-wired cable will either damage the SyncPipe or will cause incorrect timing to be received by the radio.

Once the cables are prepared, feed them through the rubber cap at the bottom of the SyncPipe and connect them to the appropriate jack. Once they are connected, replace the cap and tighten. Ensure the other end of the cables are connected to the appropriate places.

## **Operation**

Once you have the SyncPipe cabled to both the Injector and the radio, feel free to plug the Injector into an appropriate wall outlet. The power light inside the SyncPipe should turn on. At this point the SyncPipe should be providing a 1PPS signal on it's Timing Port. The SyncPipe provides this signal as long as it is powered on, even if it is unable to receive a GPS signal. Because of this, loss of the GPS signal will not prevent your AP or BH from transmitting, even if it is not correctly synchronized to the GPS timing source.

To enable the “reception” of the 1PPS signal by the radio you need to enable the Sync Input on the radio. This setting is found on the Configuration page under “Sync Input”. This should be set to “Sync to Received Signal (Timing Port)”. Once this is set and the radio is rebooted, you should see the GPS Sync Pulse Status on the status page switch to “Receiving Sync”. At this point, your radio is now synchronized.

Please note that the SyncPipe will not populate any of the fields on the “GPS Status” screen. In the future we intend to make available an enhanced injector which will permit you to monitor the actual GPS status.

**Manufactured by:**  
**PacketFlux Technologies, Inc.**  
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