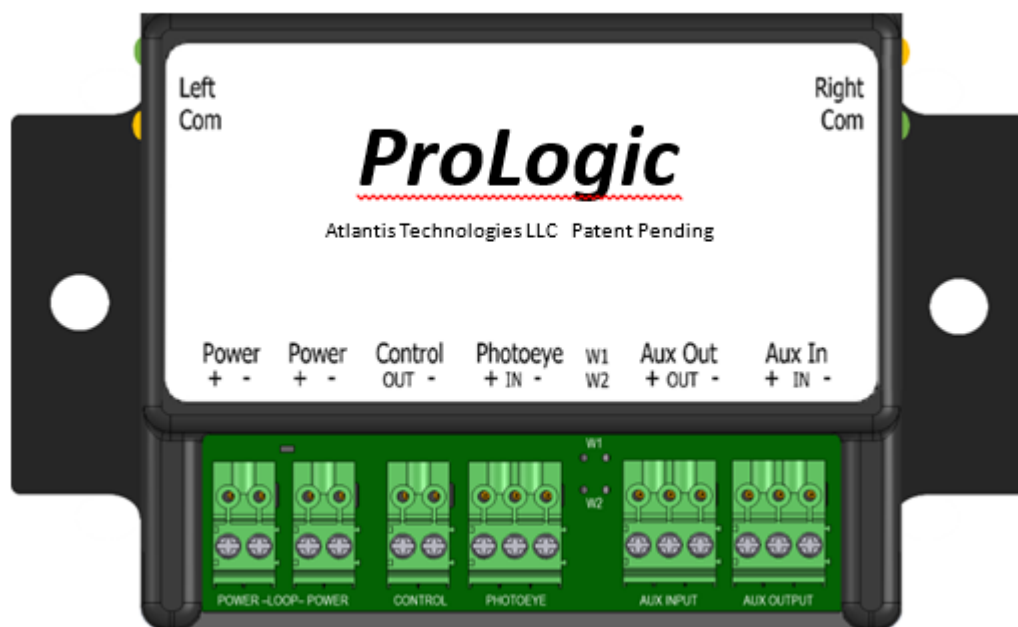


INSTALLATION AND MAINTENANCE MANUAL

ProLogic System Operational Manual



**DO NOT OPERATE
EQUIPMENT
BEFORE READING**

ATLANTIS
TECHNOLOGIES LLC

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GLOSSARY

Term	Definition
BDLR	Belt Driven Live Roller. A pneumatic system in which the rollers of a zone are driven by a belt underneath them. The belt will engage the rollers when it is raised up under them.
Downstream	When facing the <i>ProLogic</i> ZPA controller, the side of the zone in which the package leaves the zone is downstream.
Input & Output Connectors (I/O)	This would include items like limit switches, photo eyes, actuators, machine interfaces, PLCs, etc.
FM	Flat Motor Driven Roller. A system in which a flat motor drives the rollers of a zone.
ProLogic ZPA Controller (PZ)	Advanced zone controller that uses programmable parameters to characterize each controller in the system. It takes advantage of the Virtual I/O concept.
ProLogic System Configurator (PSC)	Off board programming tool used to configure the <i>ProLogic</i> system devices. This is required to configure the system for anything other than default settings.
Slug	A large block of products or packages on a conveyor with spacing determined by how they are loaded.
Upstream	When a person faces the <i>ProLogic</i> zone controller, the side of the zone in which the package enters the zone is upstream.
Virtual Input/Output (VIO)	Software configurable input and output options that include physical I/O as well as zone controller states.
Zero Pressure Accumulation (ZPA)	Mode of conveyor accumulation in which the packages on the conveyor do not touch one another, effectively keeping zero pressure on downstream packages.
Zone	Physical section of a conveyor that is controlled by one zone controller. Zones should fit only one package within them.

INTRODUCTION

The purpose of this manual is to provide knowledge regarding the operational modes and configuration of the **ProLogic** system.

WHAT IS ProLogic?

ProLogic is a distributed, programmable zero pressure accumulation (ZPA) zone controller conveyor system. The **ProLogic** system has a variety of components and programmable functions for precise customization. A **ProLogic** conveyor system does not utilize a master controller that executes all of the decision making. Each zone controller is responsible for the packages in its zone and determines locally how and when the package is moved. The inputs, outputs, statuses, and modes of other zone controllers within the system are used to determine the action taken for a given zone.

ProLogic SYSTEM FEATURES

The **ProLogic** ZPA controller is an advanced ZPA controller that offers features and abilities not available in the industry. It uses state of the art microprocessors and network functions to give a great amount of flexibility and features to a conveyor system.

MULTIPLE OPERATION MODES

The **ProLogic** system offers two modes, singulation and slug. Within each mode are multiple functions that allow easy, extensive customization to user needs. The **ProLogic** ZPA controller in its default mode works as a simple singulation ZPA system.

INDUSTRY STANDARD CONNECTIONS

There are no expensive, specialized, proprietary wiring or connectors. Only standard, low-cost, off-the-shelf cabling is required. The **ProLogic** ZPA controller works with a wide variety of input and output devices in the market place. Customers can use the photo eyes, switches, and output driving devices that are common to their location. There are no proprietary input and output devices that must be used.

REDUCED ENERGY CONSUMPTION

The **ProLogic** system is configured with a sleep function to save energy and reduce noise. When the controller has not received a new package within a user determined length of time, the zone will enter a sleep state until further action is necessary.

EXTENDED FUNCTIONALITY AND FLEXIBILITY

The **ProLogic** system comes equipped with added functionality and flexibility to meet user needs. Some of these functions include:

- Singulation Mode
- Singulation with varying package length (packages can be 2 or more zones long)
- Slug Mode
- Jam Protection in Slug Mode
- Entry Zone Interface
- Exit Zone Interface
- Index Package Release (1-50)
- Zone Sleep Timer
- Zone Discharge Timer
- Zone Loading Timer
- Kill Zone Mode
- All Stop Mode
- Patented **ProLogic** Virtual I/O
- Patented **ProLogic** Logic Engine

ProLogic SYSTEM FEATURES

SIMPLE AND QUICK CONFIGURATION

The **ProLogic** system comes with the most common settings set as default, and can be mounted and connected with no external configuration required. To use the many advanced features, a PC with a USB port is required. The patented Commbus communication network is used to easily configure the controllers in a conveyor system.

The **ProLogic** System Configurator (PSC), a user friendly Windows application, is used to configure and tune the system. The PSC gives contextual help with each section of configuration. The program also includes a real time status view, global commands, and more advanced system functions. The **ProLogic** controllers allow for quick replacement of controllers with no off board programming necessary.

OPERATIONAL MODES AND CONFIGURATION

This section of the manual will familiarize users with the different modes that the **ProLogic** system offers as well as mode configuration functions. For the purpose of this manual, the conveyor flow is left to right where upstream is to the left and downstream is to the right. See Figure 1. For more information on conveyor direction, see the section on Conveyor Direction.

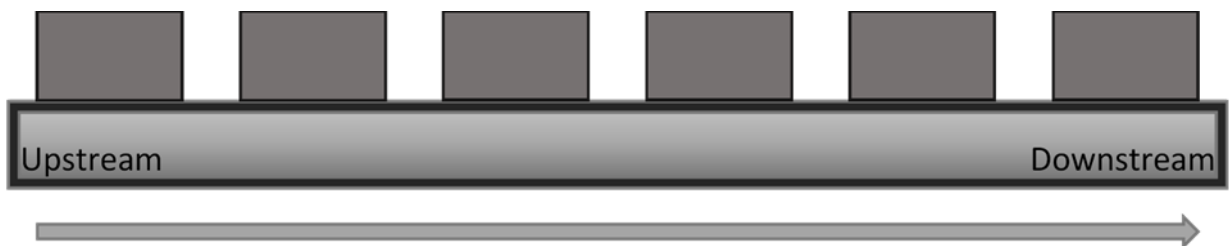


Figure 1 Typical Conveyor Stream

SINGULATION MODE

In default singulation mode, packages are loaded onto the conveyor and spaced evenly as they progress out of the first zone. Package A travels down the conveyor and stops in Zone 5. Package B follows Package A. As Package A clears each zone, Package B loads into the zone, and stops in Zone 4. Package C follows Package B in a similar manner, and stops in Zone 3. See Figure 2.

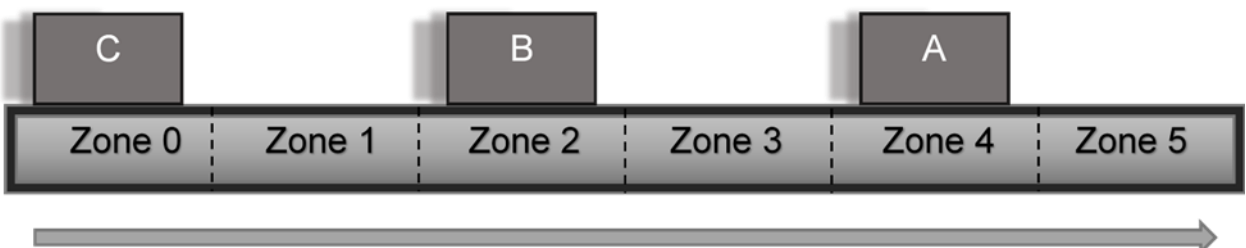


Figure 2 Singulation Mode Operation

OPERATIONAL MODES AND CONFIGURATION

When Package A reaches the end of the conveyor and the photo eye senses the leading edge of the package, the other packages will begin to accumulate upstream. Each package will stop in its individual zone so long as the zone downstream has a package. This keeps the packages evenly spaced, thus there is zero pressure accumulation. See Figure 3.

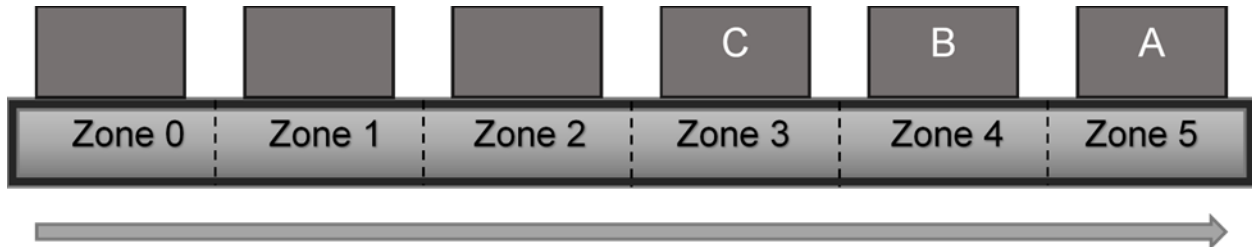


Figure 3 Singulation Mode Spacing

FIXED ZONE LENGTH

By default, the ProLogic system is set to fixed zone length. When in this mode, each package is given one zone length. Packages in fixed zone length mode may not exceed one zone length. If packages exceed one zone length without Varying Length Packages enabled, the system may not function properly.

VARYING LENGTH PACKAGES

The ProLogic system has the ability to accommodate packages of varying length. Varying length packages must be enabled with the ProLogic System Configurator. When enabled, the ProLogic system will automatically change zone length per package that it senses. For instance, if Package A fits in one zone length it will travel down the conveyor as in singulation mode. Assume Package B takes up 2, 3, or 4 zone lengths, ProLogic will assign Package B to 2, 3, or 4 zones respectively. The ProLogic system will automatically reassign zone lengths as the package travels down the conveyor as shown in Figure 4.

Note: Using Varying Length Packages when it is not necessary may decrease performance.

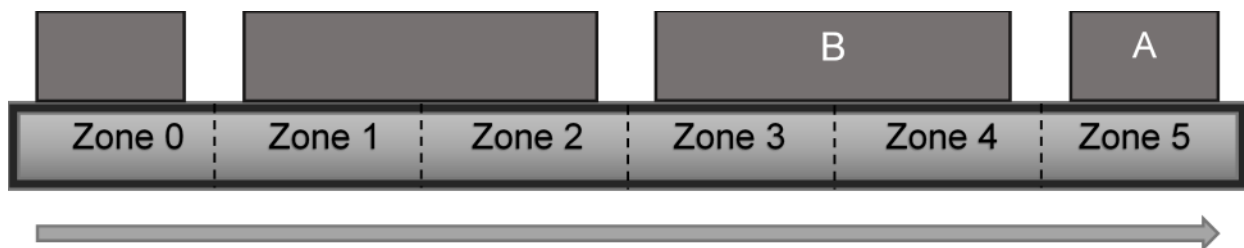


Figure 4 Singulation Mode Varying Package Length Zone Grouping

SLUG MODE

While in slug mode packages travel down the conveyor in a slug. Slug mode is used when individual package control is not required and improved throughput is desired. As a slug travels down the conveyor it will travel downstream without stopping until there are accumulated zones downstream.

When there are accumulated zones downstream from another slug, the upstream slug will accumulate in the zone upstream from the last full downstream zone. This function leaves space between slugs in a way comparable to singulation mode.

OPERATIONAL MODES AND CONFIGURATION

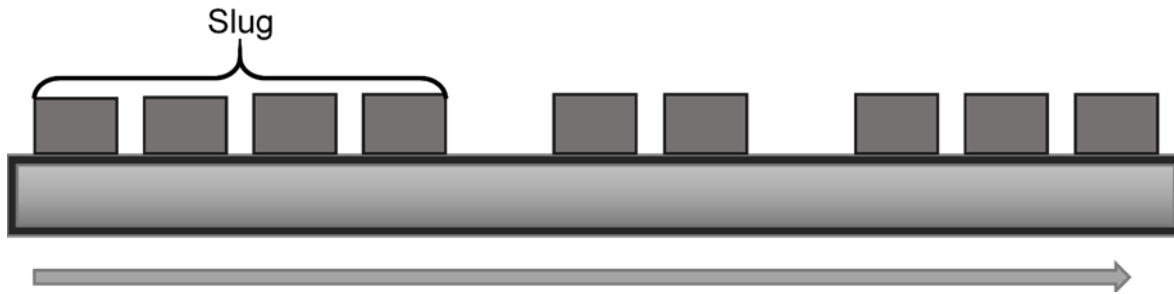


Figure 5 Slug Mode

JAM PROTECTION

The *ProLogic* system provides jam protection in slug mode. If a package remains in a zone during a discharge after the user determined Jammed Time Out timer has expired, the *ProLogic* system will recognize the package as jammed and accumulate all packages upstream until the jam has been cleared. The zone controller for the jammed zone will send out a jammed status. When a jam is cleared, operational will resume and jammed status will end.

CASCADE RELEASE

Cascade release is designed to be used at the most downstream zone of a group of zone controllers configured for slug mode. A configurable time delay is used to put space between packages as they are discharged from the conveyor system. The most downstream zone controller will wait a user determined amount of time before discharging each package of a slug. Timed release puts gaps between packages similar to singulation mode, but the spacing of packages is controlled by the value of the time delay. To use this feature, the index of packages must be greater than one.

MODE CONFIGURATION

Within each mode are multiple functions that allow further customization.

LAST ZONE STOP

The “Last Zone Stop” function will discharge one or more packages based upon Index of Packages. The most downstream controller must be configured with an input or VIO that activates the Last Zone Stop function. Index of Packages is a user determined value of packages discharged between 1 and 50.

ZONE SLEEP

If the user determined Zone Loading Timer or Zone Discharge Timer expire while waiting for a package, the zone’s sleep option will activate and stop the zone to save energy and excessive wear.

FIRST ZONE WAKE UP

Since there is no zone controller prior to the most upstream controller, some input must signal the zone activate. The First Zone Wake Up function will activate the first zone when triggered. An input from a photo eye, switch, proximity sensor, etc., or VIO can be used as input to the zone controller.

ZONE KILL

When an active “Zone Kill” signal is received, the zone controller immediately stops the zone and outputs a kill status. The adjacent upstream zone controller accumulates any packages upstream. An input from a photo eye, switch, proximity sensor, etc., or VIO can be used as input to the zone controller.

OPERATIONAL MODES AND CONFIGURATION

ALL STOP

All zone controllers in the system will immediately stop. This function is similar to a Zone Kill, but applies to all zones. Default setting is disabled. An input from a photo eye, switch, proximity sensor, etc., or VIO can be used to signal an “All Stop”

Note: All Stop does NOT power off the system and is NOT an Emergency Stop. If system maintenance is required, power off the system manually.

CONVEYOR DIRECTION

Conveyor direction, as perceived by the *ProLogic* controllers, is defined as Left-to-Right or Right-to-Left. Motor direction must also be set to follow Left-to-Right or Right-to-Left convention defined below.

LEFT-TO-RIGHT

Face the side of the conveyor that the zone controllers are mounted. The package enters on the left hand side of the conveyor zone, travels through and exits the right side of the conveyor zone. This is the default mode of all controllers.



Figure 6 Left-to-Right Conveyor Direction

RIGHT-TO-LEFT

Face the side of the conveyor that the zone controllers are mounted. The package enters on the right hand side of the conveyor zone, travels through and exits the left side of the conveyor zone.



Figure 7 Right-to-Left Conveyor Configuration

VIRTUAL I/O

VIO allows an individual controller to monitor the I/O and controller state of any other controller in the system. By using the *ProLogic* System Configurator, a user can program individual controllers to perform a function based upon these system wide states. For example, the most downstream zone can be configured to discharge a package with the Last Zone Stop function when the two zones directly upstream from it have a status of zone full. This reduces the need for external controls.

SEQUENCE OF OPERATION

The **ProLogic** system is set up in zones, each having a **ProLogic** controller. The **ProLogic** system can be used with a conveyor system such as a Flat Motor or BDLR system. The **ProLogic** system also offers two different user programmable modes: singulation mode and slug mode. Loading and release operations for the different modes are as follows:

TYPICAL ProLogic SYSTEM CONFIGURATION

A typical **ProLogic** system consists of **ProLogic** controllers, photo eyes, and auxiliary I/O. The most upstream zone consists of a photo eye at the beginning of the zone to activate the zone wake up function and a photo eye at the end of the zone to sense the package. The most downstream zone utilizes a photo eye at the end of the zone which determines when the package has arrived and when it is being discharged. Last Zone Stop determines how the packages are discharged. The zones in between the most upstream and most downstream will each have a photo eye at the end of the zone to sense when a package enters, occupies, or clears the zone. Each zone has its own controller connected to the others via the communications connectors on either side of the controller.

SINGULATION MODE - LOADING

- When a package is placed on the conveyor it will activate the zone wakeup sensor (photo eye, proximity, limit switch, etc.) and continue down the conveyor until it reaches the most downstream zone. This is accumulating.
- If two packages are placed on the conveyor with less than one zone length between them, they will be spaced apart into single zones.
- When Package A clears Zone 0 and stops in Zone 1, Zone 0 will accumulate Package B.
- Package B will travel into Zone 1 once Package A has cleared Zone 1.

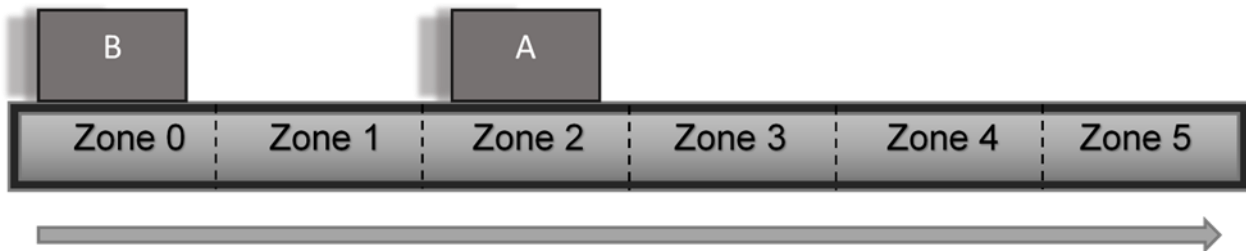


Figure 8 Singulation Mode Loading

SINGULATION MODE - RELEASE

- When Last Zone Stop is activated, the most downstream zone of the conveyor will discharge a package(s).
- Once Package A has cleared the most downstream zone, Package B will travel downstream into the most downstream zone and wait for the Last Zone Stop to be activated. The upstream packages will travel downstream, zone by zone, as long as packages are discharged. Packages are discharged one at a time unless configured otherwise the **ProLogic** System Configurator.

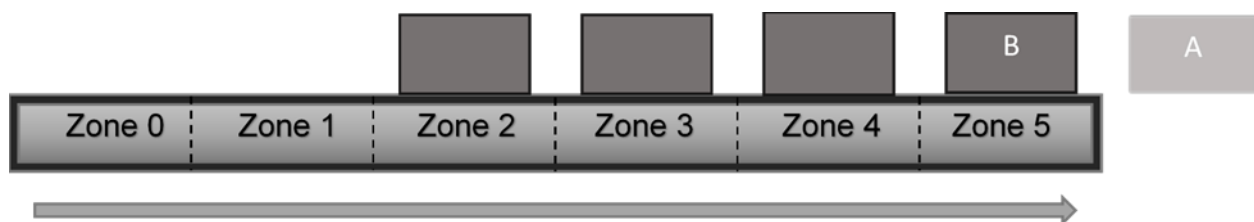


Figure 9 Singulation Mode Release

SEQUENCE OF OPERATION

SLUG MODE - LOADING

- Begin with the conveyor empty. When a package is placed on the conveyor it will trip the zone wakeup sensor and continue down the conveyor until it reaches the most downstream zone and is accumulated.
- If more than one package is placed on the conveyor with less than one zone length between them, the packages will travel downstream on the conveyor with the spacing they were loaded with.
- The zones the slug occupies will send a full signal to the empty upstream zones. A second slug will be accumulated in the zone upstream from the most upstream zone the first slug occupies. Therefore, there is zone spacing much like singulation mode in between slugs.
- Slugs may vary in size and may only have one package if they are loaded with such spacing.

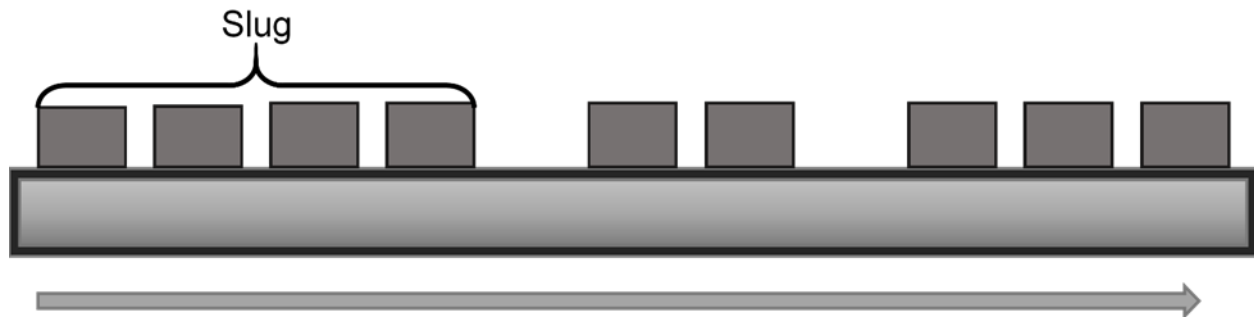


Figure 10 Slug Mode Loading

SLUG MODE - RELEASE

- When Last Zone Stop is activated, the most downstream zone of the conveyor will discharge a package(s).
- Once package has cleared the most downstream zone, next package will travel downstream to the most downstream zone sensor and wait for the Last Zone Stop to be activated. The upstream packages will all travel downstream in their respective slugs as packages are discharged. Like singulation mode, slug mode discharges packages one at a time unless otherwise configured with the **ProLogic** System Configurator.

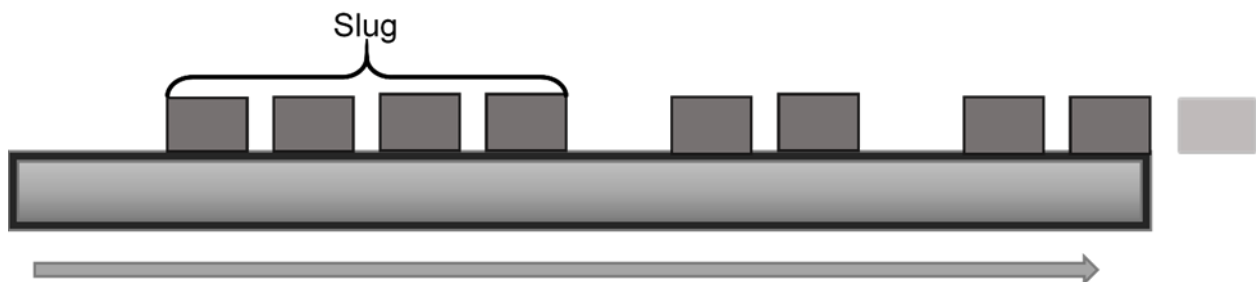


Figure 11 Slug Mode Release

ProLogic

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