triforce Documentation

Release 0.1.0

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CHAPTER 1

VESC Canbus Communication

- A CAN Bus frame can contain a maximum of 8 bytes of data.
- Each CAN node has a unique ID, the ID determines the priority (ID 0 is most dominant).
- CAN messages from VESC use an extended ID (EID), containing the COMMAND and CONTROLLER_ID.

1.1 CANBus Control

These commands can be sent to a VESC node to control the motor and request status.

Command	ID	Data	Data Length	Data Type	Units
CAN_PACKET_SET_DUTY	0	Motor Duty Cycle	32-bit/4-byte	Signed Integer	Thousandths of percent (5000 0 –> 50%)
CAN_PACKET_SET_CURRENT	1	Motor Current	32-bit/4-byte	Signed Integer	mA
CAN_PACKET_SET_CURRENT_BRAKE	2	Motor Brake Current	32-bit/4-byte	Signed Integer	mA
CAN_PACKET_SET_RPM	3	Motor RPM	32-bit/4-byte	Signed Integer	ERPM
CAN_PACKET_SET_POS	4	Motor Position			
CAN_PACKET_FILL_RX_BUFFER	5				
CAN_PACKET_FILL_RX_BUFFER_LONG	6				
CAN_PACKET_PROCESS_RX_BUFFER	7				
CAN_PACKET_PROCESS_SHORT_BUFFER	8				
CAN_PACKET_STATUS	9	Request status	N/A		
CAN_PACKET_SET_CURRENT_REL	10				
CAN_PACKET_SET_CURRENT_BRAKE_REL	11				

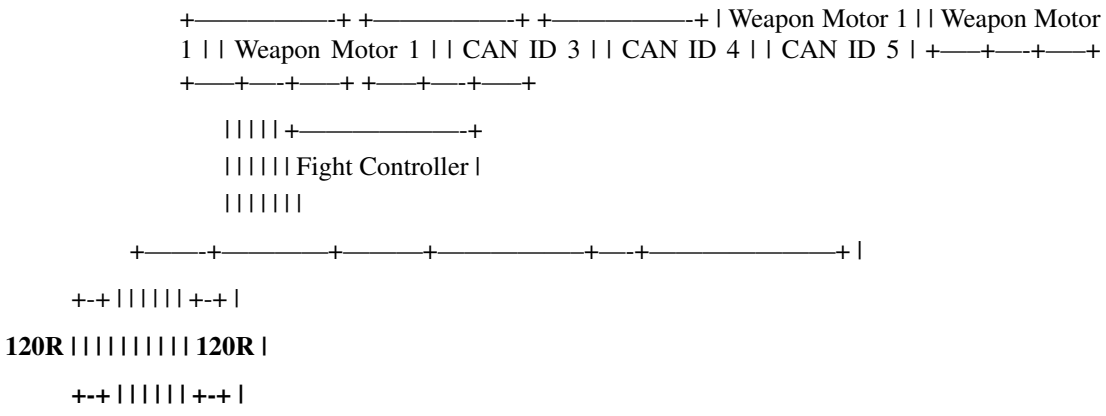
- Motor position requires an encoder to be present.

1.2 CanBus Status

The VESC can be configured to send status updates at a set frequency.

1.3 Triforce Network Topology

“‘



+————————+————————+————————+————-+————————+————————-+ |

| | | | |

| | | | CAN ID 0 |

+——+——+——+ +——+——+——+ +————————-+ | Drive Motor 1 | | Drive Motor 1 | | CAN ID 1 | | CAN ID 2 | +————————+ +————————+

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CHAPTER 2

Drive Modes

Triforce can operate in various drive configurations, these are described below. Please ensure you have the correct drive mode configured, otherwise Triforce will not move as expected.

2.1 3-Wheel Holonomic Drive

AKA Omni-Drive. This mode can operate using three standard rubber wheels or three omni wheels.

2.2 2 Wheel Differential Drive

A simple 'backup' drive configuration that requires less torque from the motors.

2.3 Links

- Society of Robotics: Robot Omni Wheel
- WikiBooks: Types of Robot
- Classification of Robots

CHAPTER 3

Channels

CHAPTER 4

Turnigy 9X

Channel #	Position	Purpose (Weapon Mode)	Purpose (Drive Mode)
Channel 1	Right stick X direction (Aileron)		
Channel 2	Right stick Y direction (Elevation)		
Channel 3	Left stick Y direction (Throttle)	Ring speed	
Channel 4	Left stick X direction (Rudder)		
Channel 5	Right back small switch	Arm weapon	
Channel 6	Top right dial		
Channel 7	Not used	Not used	Not used
Channel 8	Not used	Not used	Not used

CHAPTER 5

Spekrum DX6

Channel #	Position	Purpose (Drive Mode)	Purpose (Drive Mode)
Channel 1	Left stick Y direction (Throttle)		
Channel 2	Right stick X direction (Aileron)		
Channel 3	Right stick Y direction (Elevation)		
Channel 4	Left stick X direction (Rudder)		
Channel 5	Switch A	Arm drive	
Channel 6	Switch D		

CHAPTER 6

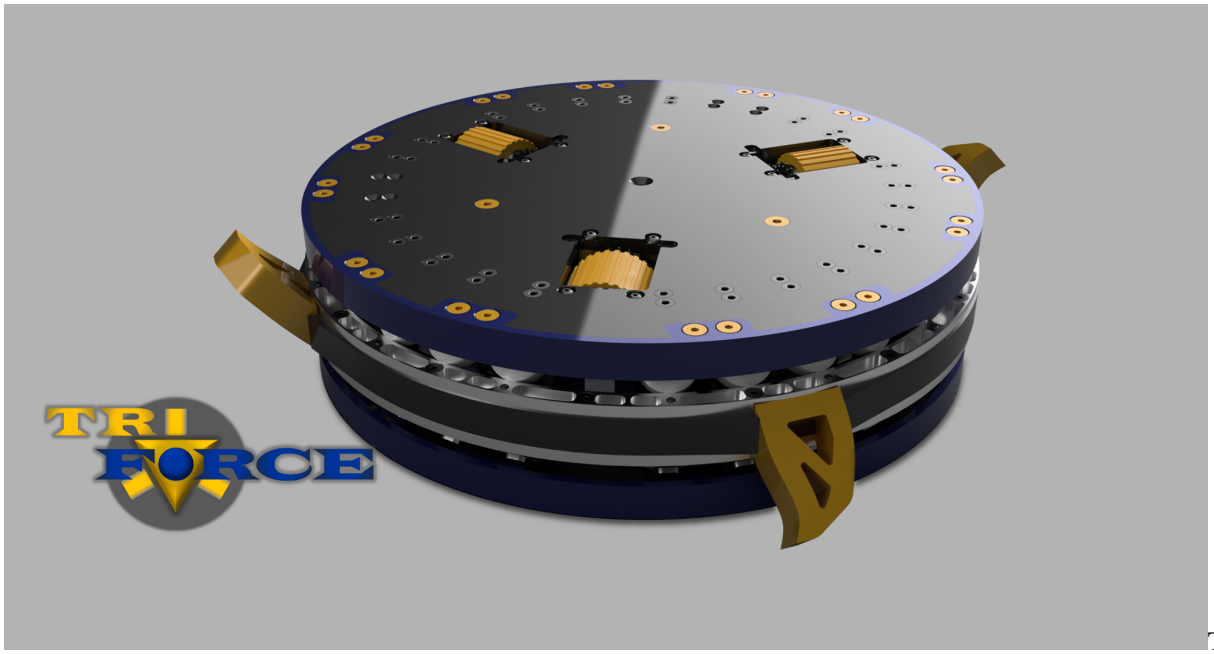
Hardware Versions

6.1 Triforce Jr. Jr. Jr.

Triforce Jr. Jr. Jr.

This was an early prototype that unfortunately did not reach combat spec. An off-the-shelf omni-mixer was demonstrated in this cardboard prototype. We decided in the end to roll our own omni-mixer for Triforce Alpha.

6.2 Triforce Alpha



Triforce Alpha

The very first (semi)functional version of Triforce used a three-wheel omni-drive system. We suffered a lot of teething issues with this, and shortly abbandoned the concept. In the future we do hope to resurrect this drive

method. We would much rather get a functional robot to start with, before investing considerable time into engineering a heavyweight omni-drive system.

6.3 Triforce Beta

Triforce Alpha

CHAPTER 7

Indices and tables

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