

### APPENDIX A Snowmobile Description Form for IC Engine Sleds

Please fill out the following form and **return it to the registration desk**. Answer all questions about your snowmobile as it is actually competing (not as it was intended to compete).

Team Name Clarkson Winter Knights Team Number: 02

Chassis-Year and Model 2017 Ski-Doo Renegade Sport 600 ACE

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 4 stroke Number of cylinders 2

Engine Displacement (cc) 600

Engine Manufacturer Rotax

Engine Modifications (if any) N/A

Compression Ratio 12:1

Turbocharged? Or Supercharged? Yes or  No – If Yes circle one

Engine Management System Motec M130

Fuel Delivery -Carburetors,  EFI, SDI – (circle one)

Fuel Pump Pressure 55 psi Fuel Type (circle one)  gasoline or diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) Lambda Mapp (Fuel Mixture Air) - (lost of loop) Fuel

Catalyst? Type? yes - 3 way, Filter-Converter

Secondary Air Injection? - Yes or  No (circle one)

Exhaust Gas Recirculation? -  Yes or No (circle one)

Other \_\_\_\_\_

Noise Control  
Muffler Design Packed Fiberglass Design, Active Exhaust Valve

Noise Treatment \_\_\_\_\_

Cooling  
Describe Strategy Stack Heat Exchanger

Other Unique Features of Your Snowmobile  
Describe Strategy EGR system / Exhaust Valve (Active)



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Team Name Team Quets Team Number 3

Chassis-Year and Model Ski-Doo MXZ 2016

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 4-stroke Number of cylinders 2

Engine Displacement (cc) 600

Engine Manufacturer Rotax

Engine Modifications (if any) \_\_\_\_\_

Compression Ratio 10:1

Turbocharged? or Supercharged? Yes or No – If Yes circle one

Engine Management System Motec M400

Fuel Delivery -Carburetors, EFI, DI, SDI – (circle one)

Fuel Pump Pressure 60 psi Fuel Type (circle one) Gasoline or Diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) Stoichiometric

Catalyst? Type? 3way catalysis

Secondary Air Injection? - Yes or No (circle one)

Exhaust Gas Recirculation? No or No (circle one)

Other \_\_\_\_\_

Noise Control  
Muffler Design ~~OEM~~ Custom muffler, sound packing

Noise Treatment Custom drive sprocket, Modified track (Camso)

Cooling  
Describe Strategy OEM

Other Unique Features of Your Snowmobile  
Describe Strategy \_\_\_\_\_

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Team Name W-Platteville IC team 2+@ Team Number: 4

Chassis-Year and Model 2017 Arctic Cat ZR 7000 LXR

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 4 Number of cylinders 3

Engine Displacement (cc) 995cc

Engine Manufacturer Ford

Engine Modifications (if any) none

Compression Ratio 10:1

Turbocharged? Or Supercharged? Yes or No -- If Yes circle one

Engine Management System Motec M142 ECU

Fuel Delivery - Carburetors, EFI, DI, SDI - (circle one)

Fuel Pump Pressure 50 psi Fuel Type (circle one) gasoline or diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) stoichiometric

Catalyst? Type? 3way oxidation/reduction catalyst

Secondary Air Injection? - Yes or No (circle one)

Exhaust Gas Recirculation? - Yes or No (circle one)

Other \_\_\_\_\_

Noise Control  
Muffler Design resonator, multichambered muffler

Noise Treatment custom canso track, undercoating, belt drive, bogey wheel placement

Cooling  
Describe Strategy Modified ZR 8000 cooling system

Other Unique Features of Your Snowmobile  
Describe Strategy Ford EcoBoost 1L, DI, Variable Cam, fly by wire, hydraulic steering, Hayes ABS, custom ported track



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Team Name Michigan Tech. University Team Number 005

Chassis-Year and Model 2014 Yamaha Phazer

Engine  
Engine Cycle (2-stroke  4-stroke, or rotary) 4-stroke Number of cylinders 2

Engine Displacement (cc) 500

Engine Manufacturer Yamaha

Engine Modifications (if any) \_\_\_\_\_

Compression Ratio 12.5:1

Turbocharged? or Supercharged? Yes or  No - If Yes circle one

Engine Management System Performance Electronics

Fuel Delivery - Carburetors  EFI, DI, SDI - (circle one) EFI PFI

Fuel Pump Pressure 55 psi Fuel Type (circle one)  Gasoline or Diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) stoichiometric Lean (λ=1-1.1)

Catalyst? Type? Alloy Ceramic - see design Paper for details

Secondary Air Injection? - Yes or  No (circle one)

Exhaust Gas Recirculation? - Yes or  No (circle one)

Other \_\_\_\_\_

Noise Control  
Muffler Design Catalyst + Custom muffler

Noise Treatment Lizard skin Paint / Sounddow / Isolated Drivers / Rear Skid mt.

Cooling  
Describe Strategy Stock

Other Unique Features of Your Snowmobile  
Describe Strategy Fully Isolated Rr Susp. / Drivers / Air Intake / 10" Big wheel Kit



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Team Name IOWA STATE UNIVERSITY Team Number 6

Chassis-Year and Model 2015 POLARIS RUSH

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 2-STROKE Number of cylinders 2

Engine Displacement (cc) 599cc

Engine Manufacturer POLARIS

Engine Modifications (if any) N/A

Compression Ratio 12.1:1

Turbocharged? or Supercharged? Yes or  No - If Yes circle one

Engine Management System POWER COMMANDER V WITH STOCK ECU

Fuel Delivery -Carburetors, EFI, DI,  SDI - (circle one)

Fuel Pump Pressure 58.6 psi Fuel Type (circle one)  Gasoline or Diesel

Emission Control  
Air/Fuel Ratio Chosen  (lean stoichiometric?) 15.7:1 (1.08 lambda)

Catalyst? Type? YES, 2

Secondary Air Injection? - Yes or  No (circle one)

Exhaust Gas Recirculation? - Yes or  No (circle one)  
Other \_\_\_\_\_

Noise Control  
Muffler Design REACTIVE MUFFLER WITH CHAMBERS & DEFLECTORS

Noise Treatment LINEX TUNNEL SPRAY, ENSOLITE FOAM, REACTIVE MUFFLER

Cooling  
Describe Strategy STOCK

Other Unique Features of Your Snowmobile  
Describe Strategy N/A

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Team Name UISE VICSC Team Number: 07

Chassis-Year and Model 2013 Ski-doo MXZ-TNT 800 E-TEC

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 2 stroke Number of cylinders 2

Engine Displacement (cc) 797cc

Engine Manufacturer Rotax

Engine Modifications (if any) Custom tuned-pipe and muffler.

Compression Ratio 12.3:1

Turbocharged? Or Supercharged? Yes or  No - If Yes circle one

Engine Management System Stock computer

Fuel Delivery -Carburetors, EFI,  DI, SDI - (circle one)

Fuel Pump Pressure 45 psi Fuel Type (circle one) gasoline or diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) Lean, for most map, rich at top end

Catalyst? Type? 3-way

Secondary Air Injection? - Yes or  No (circle one)

Exhaust Gas Recirculation? - Yes or  No (circle one)  
Other \_\_\_\_\_

Noise Control  
Muffler Design Custom, perforated tube and expansion chambers

Noise Treatment Strategic placement of noise material, resonator noise attenuation

Cooling  
Describe Strategy Stock, coolant runs through heat exchanger in tunnel

Other Unique Features of Your Snowmobile  
Describe Strategy Perforated Track, large bogey wheels on the back to reduce rolling-resistance  
Reduce noise and weight

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Team Name Northern Illinois University Team Number: 08

Chassis-Year and Model 2015 Polaris Indy 600

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 2-Stroke Number of cylinders 2

Engine Displacement (cc) 600

Engine Manufacturer Polaris

Engine Modifications (if any) N/A

Compression Ratio 95 psi

Turbocharged? Or Supercharged? Yes or  No – If Yes circle one

Engine Management System Power Commander V

Fuel Delivery -Carburetors, EFI, DI, SDI – (circle one) EFI

Fuel Pump Pressure 60 psi Fuel Type (circle one)  gasoline or diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) Stoichiometric

Catalyst? Type? 3 Way Catalyst BKF/Emitech

Secondary Air Injection? - Yes or  No (circle one)

Exhaust Gas Recirculation? – Yes or  No (circle one)  
Other \_\_\_\_\_

Noise Control  
Muffler Design N/A

Noise Treatment N/A

Cooling  
Describe Strategy Stock

Other Unique Features of Your Snowmobile  
Describe Strategy Big Wheel kit (Reduce Rolling Resistance)



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Team Name Sury - Buffalo Team Number: 012

Chassis-Year and Model 2017 Arctic Cat Bearcat 3000

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 4-stroke Number of cylinders 2

Engine Displacement (cc) 700

Engine Manufacturer Kymco

Engine Modifications (if any) Turbocharged

Compression Ratio 8.1

Turbocharged Or Supercharged? Yes or No – If Yes circle one

Engine Management System Doback Piggyback ECU

Fuel Delivery -Carburetors, EFI DI, SDI – (circle one)

Fuel Pump Pressure 45 psi Fuel Type (circle one) gasoline or diesel

Emission Control

Air/Fuel Ratio Chosen (lean, stoichiometric?) Stoichiometric

Catalyst? Type? magniflow Catalyst

Secondary Air Injection? - Yes or No (circle one)

Exhaust Gas Recirculation? – Yes or No (circle one)

Other \_\_\_\_\_

Noise Control

Muffler Design Stock Muffler

Noise Treatment \_\_\_\_\_

Cooling

Describe Strategy Heat exchanger

Other Unique Features of Your Snowmobile

Describe Strategy \_\_\_\_\_



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Team Name SCSU Slick Cylinders Team Number: 13

Chassis-Year and Model 2015 Polaris Rush 800 Pro-S

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 4-stroke Number of cylinders 2

Engine Displacement (cc) 1000

Engine Manufacturer Polaris

Engine Modifications (if any) None, stock RZR XP 1000 engine.

Compression Ratio 11:1

Turbocharged? Or Supercharged? Yes or No - If Yes circle one

Engine Management System 2012 Polaris RZR XP 900 ECU + DynaJet

Fuel Delivery -Carburetors EFI, DI, SDI - (circle one) 48mm EFI

Fuel Pump Pressure 36 psi Fuel Type (circle one) gasoline or diesel

Emission Control

Air/Fuel Ratio Chosen (lean, stoichiometric?) Mostly 14.7 AFR, some lean, some rich

Catalyst? Type? 2014 Chevrolet Aveo

Secondary Air Injection? - Yes or No (circle one)

Exhaust Gas Recirculation? - Yes or No (circle one)

Other None

Noise Control

Muffler Design Stock 2015 Polaris Rush 800 Pro-S

Noise Treatment None

Cooling

Describe Strategy Added radiator from 2007 Yamaha Attrak after front/rear heat exchanger + added fan + added airflow vents.

Other Unique Features of Your Snowmobile

Describe Strategy Engine swapped 2-stroke with 4-stroke RZR XP 1000 engine.

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Team Name University of Minnesota Duluth Team Number: 14

Chassis-Year and Model 2017 Arctic Cat Z123000

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 4-Stroke Number of cylinders 2

Engine Displacement (cc) 700

Engine Manufacturer Kymco/Arctic Cat

Engine Modifications (if any) Turboscharger, Exhaust gas recirculation, Custom exhaust

Compression Ratio 11:1

Turbocharged? Or Supercharged? Yes or No - If Yes circle one

Engine Management System Halttech Elite Standalone

Fuel Delivery -Carburetors  EFI,  DI,  SDI - (circle one)

Fuel Pump Pressure 47 psi Fuel Type (circle one)  gasoline or diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) Stoichiometric

Catalyst? Type? Yes, 3-Way

Secondary Air Injection? - Yes or  No (circle one)

Exhaust Gas Recirculation? -  Yes or No (circle one)  
Other \_\_\_\_\_

Noise Control  
Muffler Design Anaechoic chamber reduction design

Noise Treatment Muffler, Sound cancelling material

Cooling  
Describe Strategy Radiator, water to air intercooler

Other Unique Features of Your Snowmobile  
Describe Strategy \_\_\_\_\_

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Team Name BISON MOTORSPORTS Team Number: 101

Chassis-Year and Model 2015 POLARIS WIDETRACK LX

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) DIESEL Number of cylinders 3

Engine Displacement (cc) 904cc

Engine Manufacturer YANMAR

Engine Modifications (if any) TOOK INTERNALS

Compression Ratio 18:1

Turbocharged? Or Supercharged? Yes or No – If Yes circle one

Engine Management System N/A (MECHANICAL)

Fuel Delivery -Carburetors, EFI, DI, SDI – (circle one) MECHANICAL

Fuel Pump Pressure W psi Fuel Type (circle one) gasoline or diesel

Emission Control

Air/Fuel Ratio Chosen (lean, stoichiometric?) \_\_\_\_\_

Catalyst? Type? YES, TWO (2); VW AUTO TDI DOC/DPF, MAGNAFLOW UNIVERSAL CATALYTIC CONVERTER

Secondary Air Injection? - Yes or No (circle one)

Exhaust Gas Recirculation? – Yes or No (circle one)

Other \_\_\_\_\_

Noise Control  
Muffler Design TURBO/DOL/DPF

Noise Treatment LIQ BRD 2" BRND NOISE REDUCING PAINT

Cooling  
Describe Strategy LIQUID COOLED; USING STOCK POLARIS HEAT EXCHANGERS

Other Unique Features of Your Snowmobile  
Describe Strategy SIDE SKIRTS UNDER RUNNING BOARDS TO REDUCE NOISE, HIGH/LOW/NEUTRAL/REVERSE GEAR BOX



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Team Name Sony - Buffalo Team Number: 102

Chassis-Year and Model 2015 Polaris Indy Adventure

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 4-stroke Number of cylinders 3

Engine Displacement (cc) 799

Engine Manufacturer Mercedes-Benz

Engine Modifications (if any) \_\_\_\_\_

Compression Ratio 18:1

Turbocharged? Or Supercharged? Yes or No – If Yes circle one

Engine Management System Specialist Components ECU and injector driver

Fuel Delivery -Carburetors, EFI, D, SDI – (circle one)

Fuel Pump Pressure 13 psi Fuel Type (circle one) gasoline or diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) \_\_\_\_\_

Catalyst? Type? Diesel Oxidation Catalyst

Secondary Air Injection? - Yes or No (circle one)

Exhaust Gas Recirculation? - Yes or No (circle one)  
Other \_\_\_\_\_

Noise Control  
Muffler Design \_\_\_\_\_

Noise Treatment \_\_\_\_\_

Cooling  
Describe Strategy Rear mounted heat exchanger

Other Unique Features of Your Snowmobile  
Describe Strategy \_\_\_\_\_

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Team Name UW-Platteville Diesel Team Number: 111

Chassis-Year and Model 2017 Arctic Cat Bearcat 3000 LT

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 4-stroke Number of cylinders 3

Engine Displacement (cc) 898 cc

Engine Manufacturer Kubota

Engine Modifications (if any) None

Compression Ratio 24:1

Turbocharged? Or Supercharged? Yes or  No - If Yes circle one

Engine Management System None

Fuel Delivery -Carburetors, EFI, DI, SDI - (circle one) IDI

Fuel Pump Pressure 3 psi Fuel Type (circle one) gasoline or  diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) stoichiometric

Catalyst? Type? Diesel Oxidation Catalyst

Secondary Air Injection? - Yes or  No (circle one)

Exhaust Gas Recirculation? - Yes or  No (circle one)

Other \_\_\_\_\_

Noise Control  
Muffler Design Stock Bearcat 3000

Noise Treatment Polydamp foam, undercoating

Cooling  
Describe Strategy Stock Bearcat 3000

Other Unique Features of Your Snowmobile

Describe Strategy Large rear idler wheels, belt drive, Clutching and gears, Hayes ABS



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Team Name Team Quiets-DUC Team Number 112

Chassis-Year and Model Ski-Doo Tundra 2017

Engine  
Engine Cycle (2-stroke, 4-stroke or rotary) 4-stroke Number of cylinders 3

Engine Displacement (cc) 1098

Engine Manufacturer Kohler

Engine Modifications (if any) \_\_\_\_\_

Compression Ratio 22.8:1

Turbocharged? or Suprcharged? Yes or No – If Yes circle one

Engine Management System OEM (mechanical)

Fuel Delivery -Carburetors, EFI, DI, SDI – (circle one)

Fuel Pump Pressure 60 psi Fuel Type (circle one) ~~Gasoline~~ or Diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) lean (2.5:1)

Catalyst? Type? DOC/DPF

Secondary Air Injection? - Yes or No (circle one)

Exhaust Gas Recirculation? – Yes or No (circle one)  
Other \_\_\_\_\_

Noise Control  
Muffler Design OEM (Ski-Doo)

Noise Treatment Sound foam, Silent drive

Cooling  
Describe Strategy OEM

Other Unique Features of Your Snowmobile  
Describe Strategy \_\_\_\_\_

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Team Name JAG WAIVE Team Number: 113 Joshua Whit

Chassis-Year and Model 2015

Engine  
Engine Cycle (2-stroke, 4-stroke, or rotary) 4-stroke Number of cylinders 3

Engine Displacement (cc) 900

Engine Manufacturer Kubota

Engine Modifications (if any) N/A

Compression Ratio 24:1

Turbocharged? Or Supercharged? Yes or  No - If Yes circle one

Engine Management System Kubota stock

Fuel Delivery -Carburetors, EFI, DI, SDI - (circle one)

Fuel Pump Pressure 1991 psi Fuel Type (circle one) gasoline or  diesel

Emission Control  
Air/Fuel Ratio Chosen (lean, stoichiometric?) Stoichiometric

Catalyst? Type? DPF/ CO catalyst

Secondary Air Injection? - Yes or  No (circle one)

Exhaust Gas Recirculation? - Yes or  No (circle one)  
Other \_\_\_\_\_

Noise Control  
Muffler Design Stock muffler Kubota

Noise Treatment \_\_\_\_\_

Cooling  
Describe Strategy SLED Integrated water Cooling

Other Unique Features of Your Snowmobile  
Describe Strategy \_\_\_\_\_