South Dakota Highway Patrol
Aviation Unit
Trooper Sarah Schumacher
Introduction

• Pilot since 2005
• B.S. in Aviation from South Dakota State University
• Airplane Single and Multi-Engine Land, Instrument airplane, CFI, CFII, MEI, Remote Pilot
• FAA Safety Team Representative and FAAST “Drone Pro”
• Law Enforcement: dispatcher from 2013-2015, SDHP Academy Class 59 in 2016
• Grew up in Watertown, living in Pierre, SD since 2017
Sir I’m giving you a citation today.

Best traffic stop ever!!
History of Aviation in South Dakota Highway Patrol

• 1960’s – Speed enforcement began. SDHP leased a Super Cub. Pilots and spotters utilized stop watches to determine speed over distances.

• 1970’s – Speed enforcement continued. In the late 1970’s, SDHP purchased a used Cessna 182 Skylane.
• 1981 – SDHP replaced the Skylane with a new Cessna 182 Skylane RG.

• Late 1980s – “Drug War”, the SDHP started working counter-drug operations including marijuana identification and eradication.

• 1995 – SDHP added OH-58C Bell Helicopter for marijuana eradication, emergency relays, natural disaster response, etc.

• 2007 – SDHP purchases 2004 Cessna T206 to replace the aging 182 Skylane RG.

• 2014 – SDHP purchases first FLIR system and fits to both helicopter and airplane.
SDHP Aviation Unit Today

• Average of 353 hours flown a year over 81 different “unique” missions, increasing every year

• 81% of use is directly related to missions/enforcement, rest is training and transportation and emergency relays.

• Over the last 3 years, HP500 has utilized 60/75 (80%) of public airports in the state for enforcement or services
What we actually “do”

- Traffic enforcement (speed, stop sign, passing zone, following too closely)
- Traffic complaints
- Aggressive/reckless driving/DUI
- Search and rescue
- Pursuit management
- Drug interdiction
- Emergency response/relay
- Tactical overwatch
- Traffic control, fire spotting, etc
- High profile events
Why an airplane?

- SD is a BIG state ~77,000 square miles
- Helicopters are limited by weight, range, speed
- Helicopters are very high liability
- Helicopters require significantly more maintenance, which means more down time and more money
- Cessna T206 is a good balance of speed, payload, range and simplicity
HP500

- 2007 Cessna T206
- Turbocharged 310 horsepower Lycoming IO-540
- Configured for pilot plus 3, can add rear seating for pilot plus 5
- Extended-range fuel tanks = 117 gallons of fuel (~6.5 hours-10 hours)
- TKS ice protection
Airport Operation selection

• Main considerations:
  • Runway surface
  • Weather reporting/winter maintenance
  • VFR only or IFR approaches available
  • Fuel, hangar, services available
  • Proximity to operations
  • Easy in and out
Easy Changes

• Issue and update NOTAMs regularly, especially for runway conditions and closures.
• Weather reporting and runway information is critical
South Dakota Highway Patrol Aviation Unit
What everyone thinks the Aviation Unit is like

What the Aviation Unit is actually like
Tactical Flight Officer Program (TFO)

- Specialized training in systems and techniques
- Thermography training
- Aerial Search and Rescue training
TFO Training Program

- TFO’s must possess a variety of skills:
  - Ability to work in and around small aircraft
  - Good spatial orientation
  - Location, location, location!
  - Law enforcement tactics – MFF, SWAT, Use of Force
FLIR 230-HD

- thermal imaging system, utilizes “day time”, “low light” and “Infra-red” camera sensors
- Purchase and installation was approximately $500,000 in 2014 for “sensor pod”, aircraft mounting, monitors and controllers, radio upgrades, weight and balance changes for helicopter and airplane
- This is where the SDHP began shifting from primarily speed enforcement towards “tactical” enforcement.
What is Forward Looking Infra-Red? (IR)

• A thermal, or infrared camera, is a non-contact device that detects infrared energy (heat) and converts it into a visual image.
• That image is interpreted by the operator.
Different functions

We utilize different:
- Color palettes
- Settings
- Sensors

To achieve our goal. Tracking a vehicle on a drug interdiction operation is different from searching for a suspect after a pursuit, which is different from a high-risk fugitive warrant.
IR color palettes
Different color palettes allow different details to “pop” on an image. This is especially important in low-contrast situations.
Histogram

- Graphical depiction of amount of “light” in an image – can be over-exposed (washed out) or under-exposed (too dark)

- Histogram increases contrast of an image – adjusts the intensity of the whites/blacks

- Useful for IR images where there is both light and dark in the same image – shows different detail
Histogram Examples

- Washed out
- Too much gray – not enough true black and white
Digital Detail Enhancement
Aircraft Missions

• SDHP airplane flies year round, in all seasons and all weather conditions
• Operates in and out of 60/75 public airports in SD
• Examples of missions include:
  • Traffic enforcement
  • Motor carrier enforcement
  • Pursuit management
  • Drug Interdiction
  • Traffic control
  • Tactical overwatch
Traffic Enforcement
“putting cars on the side of the road”

- Stop sign violation, speeding, passing, reckless/aggressive driving, traffic complaints, following too closely, move over violations, DUI enforcement

- SDHP Aircraft has made multiple DUI and drug arrests from the air by observing violations and getting a trooper in position to stop vehicle.
High Speed Pursuits

- Vehicle pursuits are a very high liability law enforcement function.
- Pursuits can last anywhere from a few seconds to 2+ hours in South Dakota.
- Aircraft allows units in pursuit to slow down and fall back while aircraft follows the vehicle. This decreases dangerous driving behavior of driver and LEO
- Low risk of aircraft being out-run by suspect
- If aircraft is tracking and vehicle stops, crashes, or occupants run on foot, we are already in position to react.
Sport bike pursuit – Sioux Falls
Checkpoint Pursuit – Sioux Falls
GFP search
Pursuit search
Interdiction track and stop
FOR IMMEDIATE RELEASE

U.S. Attorney’s Office Announces 37 People Indicted in Large-Scale Meth Trafficking Network in Operation Say Uncle

United States Attorney Ron Parsons announced that 37 people have been federally indicted as part of OCDETF Operation Say Uncle. OCDETF stands for Organized Crime Drug Enforcement Task Forces, which is a "keystone of the Attorney General's strategy to reduce the availability of illicit narcotics throughout the United States using a prosecutor-led, multi-agency approach to combat transnational organized crime." OCDETF identifies, disrupts and dismantles drug traffickers, money launderers, and transnational criminal organizations.

Federal prosecutors in Rapid City, South Dakota, working cooperatively with law enforcement agencies across the State, federally charged 37 defendants with drug-related offenses, despite the challenges imposed on the criminal justice system and law enforcement officers everywhere by COVID-19. The South Dakota Attorney General’s Office charged nine persons with state offenses as part of the same Operation. The charges allege the defendants conspired with each other to bring multiple pounds of methamphetamine into Western South Dakota beginning in 2019 and continuing into 2020.

Agencies involved in this effort include the South Dakota Division of Criminal Investigation, Drug Enforcement Administration, U.S. Marshals Service, Bureau of Alcohol, Tobacco, and Firearms, Rapid City Police Department, Pennington County Sheriff’s Office, Internal Revenue Service, U.S. Postal Inspection Service, Federal Bureau of Investigation, South Dakota Highway Patrol, Deadwood Police Department, Lawrence County Sheriff’s Office, Spearfish Police Department, Homeland Security Investigations, and Oglala Sioux Tribe Department of Public Safety. Outside of South Dakota, agencies assisted from the Reno County (KS) Drug Enforcement Unit, Billings (MT) Drug Task Force, Wyoming
North Oahe – Stranded boater
SDHP UAS
Program History

- 2016 – Started with 2 Sentera Omni
  Inspect drones with FLIR, 4 RPIC’s
- 2020 – Added 2 Autel Evo II
- 2021 – Added 8 more Autel Evo II Pro
  6K/Dual 640 drones
- 18 RPIC’s throughout the state
2016 – Sentera Omni Inspect

- 2 units, 4 operators (Sioux Falls and Rapid City)
- Zenmuse XT FLIR system
- Primary uses: tactical overwatch, searches, disaster assessment, crash and crime scene photos
Autel Evo II

• 2020-2021
• 10 units: 7 Pro 6K Rugged, 3 Dual 640 Thermal Rugged
• 18 Remote Pilots
• Primary use: crash and crime scene photography, mapping, reconstruction
• Additional uses: Tactical overwatch, searches, firespotting, disaster assessment, etc
Autel Evo II Dual 640 (Thermal)
Autel Evo II Pro 6K

- Assist South Dakota DCI with search for human remains
- Altitude = 70 feet
Search Options

- Very good for searching small areas
- Program rectangular, polygon, and waypoint missions and fly autonomously
- Can record continuous video or take photos with overlap
- All photos are geo-referenced
Crash Scene Reconstruction

• SDHP reconstructs approximately 90% of serious injury and fatality crashes in South Dakota.
• Prior to 2021, all reconstructions were done with a Leica Total Station or a 3D Scanner.
• Drones can save a lot of time, money, and help prevent secondary crashes.
Pix4D Introduction

- https://youtu.be/U7DzH5fHVtY
Crash Reconstruction
Why Part 107?

- 2 paths – Part 107 or COA
- Preferred Part 107
  - Certification test
  - Insurance requirements/Risk Management
  - Waiver options/accessibility
- LAANC
AIRMAP – Allows remote pilot to plan and autonomously file flight plans within controlled airspace

LAANC – Low Altitude Authorization and Notification Capability – allows access to controlled airspace at and below 400’

- Real-time approval for flights
NOTAM example for UAS Operation within airport airspace /ABR