

DACUM Research Chart for UAS Maintenance Technician

DACUM Subject Matter Expert Panel

Antone Andrews
Field Avionics Supervisor
General Atomics – Aeronautical Systems, Inc.
Adelanto, CA

Jonathan Beck
UAS Instructor and Program Manager
Northland Community and Technical College
Thief River Falls, MN

Tyler J. Beckman
Electronics Technician
Northrop Grumman Corporation
Grand Forks AFB, ND

Tom Biller
Avionics Instructor
Northland Community and Technical College
Thief River Falls, MN

Donald A. Fischer
Computers and Networking Instructor
Northland Community and Technical College
East Grand Forks, MN

David Jones
Curriculum Development Specialist
Praxis Aerospace Concepts, Intl.
Excelsior Springs, MO

Stephen C. Ley
FAA Assure Research Project Lead (A5)
Kansas State University Polytechnic
Salina, KS

Zackary Nicklin
UAS Maintenance Instructor
Northland Community and Technical College
Thief River Falls, MN

Terry Thornton, Jr.
Aviation Mechatronics Instructor
Dothan Technology Center
Dothan, AL

Corrie T. Volinkaty
Technical Instructor
Abaris Training
Reno, NV

Bill Webb
Avionics Technician/Field Service Engineer
U.S. Marine Corps/Textron
New Brighton, MN

DACUM Facilitators

Carolyn E. McLellan and Kim B. Utlej

Sponsored by



Produced by



June 1-2, 2016

DACUM Research Chart for UAS Maintenance Technician

Duties		Tasks				
A	Comply with UAS (Unmanned Aircraft Systems) Health and Safety Protocols	A-1 Identify UAS health and safety hazards	A-2 Practice UAS risk management	A-3 Utilize UAS personal protective equipment (PPE)	A-4 Handle UAS HAZMAT (e.g., mixing, storage, utilization)	A-5 Dispose of UAS HAZMAT
B	Comply with Foreign Object Elimination (FOE) Policies & Procedures	B-1 Practice FOE housekeeping (e.g., clean as you go)	B-2 Practice FOE zonal awareness	B-3 Employ FOE tool control practices	B-4 Report foreign object debris and damage (FOD/D)	B-5 Execute FOE lost tool procedures
C	Comply with UAS Maintenance Documentation	C-1 Review UAS technical documentation	C-2 Follow UAS technical documentation	C-3 Review UAS maintenance management system (MMS)	C-4 Generate UAS MMS record	C-5 Maintain UAS MMS
D	Perform UAS Ground Control Station (GCS) Maintenance	D-1 Emplace UAS GCS	D-2 Maintain UAS environmental control systems	D-3 Comply with UAS IA protocols	D-4 Configure UAS GCS software/firmware	D-5 Verify UAS network integrity
E	Maintain UAS Datalinks	E-1 Emplace UAS datalinks	E-2 Maintain UAS datalinks software and firmware configuration	E-3 Perform scheduled UAS datalinks maintenance	E-4 Perform unscheduled UAS datalinks maintenance	E-5 Secure UAS datalinks
F	Perform Unmanned Aircraft (UA) Maintenance	F-1 Emplace UA	F-2 Assess UA composite structures	F-3 Repair UA composite structures	F-4 Configure UA payload	F-5 Maintain UA software configuration
G	Manage UAS Ground Support Equipment (GSE)	G-1 Emplace UAS GSE	G-2 Configure UAS GSE	G-3 Perform scheduled UAS GSE maintenance	G-4 Perform unscheduled UAS GSE maintenance	G-5 Operate UAS GSE
H	Execute UA Flight Operations	H-1 Coordinate UA maintenance and flight ops schedules	H-2 Practice UA crew resource management (CRM)	H-3 Practice UA radio communications	H-4 Perform UA preflight inspections	H-5 Handle UA controlled cryptographic item (CCI)
I	Manage UAS Parts	I-1 Select UAS repair part	I-2 Receive UAS part	I-3 Process UAS defective part	I-4 Store UAS part	I-5 Maintain UAS part inventory
J	Perform UAS Administrative Functions	J-1 Comply with UAS QA policies and procedures	J-2 Maintain UAS professional credentials	J-3 Conduct UAS labor accounting	J-4 Perform UAS site survey	J-5 Manage UAS radio frequency (RF) usage

A-6 Practice UAS flight line safety protocols	A-7 Practice UAS shop safety protocols	A-8 Practice UAS operational security				
D-6 Perform scheduled UAS GCS maintenance	D-7 Perform unscheduled UAS GCS maintenance	D-8 Configure UAS GCS end product distribution (e.g., FMV, SIGINT)	D-9 Displace UAS GCS			
E-6 Optimize UAS datalinks	E-7 Displace UAS datalinks					
F-6 Perform scheduled UA maintenance	F-7 Perform unscheduled UA maintenance	F-8 Conduct UA ground handling and service operations	F-9 Modify UA composite structures	F-10 Displace UA		
G-6 Displace UAS GSE						
H-6 Evaluate UA aircraft health and status	H-7 Execute UA emergency procedures	H-8 Perform UA post-flight inspections				
I-6 Service UAS repair part						
J-6 Maintain UAS technical documentation	J-7 Generate UAS oral status reports	J-8 Generate UAS written status reports	J-9 Identify UAS calibration status (e.g., equipment, tools)	J-10 Generate UAS incident report		

General Knowledge and Skills

Access control lists
Addressing/naming schemes in data networks
Aircraft covering and finishes
Aircraft drawings
Aircraft electrical, fuel & instrument systems
Aircraft landing gear systems
Airframe inspection
Analytical and troubleshooting skills
Assembly and rigging
Auxiliary power units
Basic physics and electrical skills
BIOS/UEFI verification
Borderless, wireless and virtual local area networks
Broadband connections
Cabin atmosphere control systems
Chemical storage, use, and disposal
Cleaning and corrosion control
Collaboration technology
Command line interface commands
Commercial composites
Common manufacturing techniques
Communication and navigation systems
Composite application
Composite mechanics/failures
Computer components
Configuration files
Critical thinking skills
Customer service
Data centers
Database management
Documentation
Dynamic host configuration protocol (DHCP)
Engine cooling systems
Engine electrical systems
Engine exhaust and reverser systems
Engine fuel systems
Engine fire protection systems
Engine inspection
Engine instrument systems
Ethernet networking
Fire protection systems
Fluid lines and fittings
Fuel metering systems
Ground operation and servicing
Hydraulic and pneumatic power systems
Ice and rain control systems
Ignition and starting systems
Induction and engine airflow systems
Internet and cloud services
IPv4 and IPv6 networks
Laminate
Laptop configuration
Linux operating system
Lubrication systems
Maintenance forms and records
Maintenance publications
Materials and processes
Mathematical skills
Mechanic privileges and limitations
Mechanical ability
Microcomputer maintenance
Mobile device configuration
Negotiation skills
Network address translation (NAT)
Network architectures, configurations & utilities
Network security
Oral and written communication skills
OEM Standard Repair Manual
OS X operating system
Position and warning systems
Printer configuration
Propellers
Protocol layers in data networks
Public speaking skills
Reading comprehension
Reciprocating engines
Resource management
Routers and routing protocols
Serial connections
Sheet metal and non-metallic structures
Situational awareness
Software licensing
Subnetting and switches
Time management and organizational skills
Tunneling operations
Turbine engines
Unducted fans
Virtualization
Visual inspection skills
Weight and balance
Welding
Windows operating system
Wood structures

Future Trends and Concerns

Additive manufacturing (e.g., 3D printing)
Autonomous operations
Available bandwidth
Certification of personnel
Certification of repair stations (Part 145)
Changing workforce expectations (generational)
Data analysis and exploitation
Education and training
Ethical usage
Export administration regulations (EAR)
Human factors
Integrity of UAS with space-based systems
International traffic in arms regulations (ITAR)
Lack of qualified personnel
Liability
Line of sight (beyond)
Navigational reliability
Payload development
Proliferation of UAS into National Airspace System (NAS)
Public acceptance and concerns
Regulations
Standards (e.g., maintenance, training, manufacturing, certification)
UAS countermeasures
Virtual reality
Workforce and economic development

Acronyms

BIOS – Basic Input/output System
FMV – Full-Motion Video
HAZMAT – Hazardous Materials
IA – Information Assurance
OEM – Original Equipment Manufacturer
PPE – Personal Protective Equipment
QA – Quality Assurance
SIGINT – Signals Intelligence
UAS – Unmanned Aircraft Systems
UA – Unmanned Aircraft
UEFI – Unified Extensible Firmware Interface

Worker Behaviors

Accountable
Adaptable
Dependable
Good judgment
Hard working
Honest
Integrity
Maintains confidentiality
Mature
Motivated
Personal hygiene
Professional
Punctual
Reliable
Self-starter
Shows initiative
Safe with Social Networking
Tactful
Team player

Certifications

Certifying Technical Employee Competence (CertTEC)

- Avionics
- Basic Composites
- Basic Electricity and Electronics

Electronics Technicians Association (ETA)
International

- Associate Certified Electronics Technician (CETa)

Federal Aviation Administration (FAA)

- Aviation Maintenance Technician – Airframe and Powerplant (A&P)

Federal Communications Commission (FCC)

- General Radio Operator's License (GROL)
- Marine Radio Operator's Permit (MROP)

National Center for Aerospace and Transportation Technologies (NCATT)

- Aircraft Electronics Technician (AET)
 - Autonomous Navigation Systems (ANS)
 - Dependent Navigation Systems (DNS)
 - Radio Communication Systems (RCS)
- UAS Maintenance

Satcom Direct

- AeroIT

Tools, Equipment, Supplies and Materials

Aviation tin snips set
Aviation uniform work shirts
Awl scribe
Blankets – heat
Blow gun and air chuck for tires
Boelube
Bonder – hot
Cable tester – modular
Calculator
Caliper – dial or digital, non-plastic
Cleaning solution - electronics
Cloth – lint free
Compressed air service canister
Controller – Johnson A419
Coupler – 1/4"
Couplers for shop air hose – L (Lincoln) type quick
Data logger
Die grinder – 90 degree
Drill bit – #11, #21, #30, #40
Drill motor – pneumatic, 3/8"
Drive adaptor – 1/2" to 3/8"
Drive socket set (3/8") and ratchet (12 point) – 3/8"
through 7/8" deep
Drive socket set (1 1/4") – 12 point & 6 point
extensions, 3" – 6"
Electrostatic discharge protection kit
Electrostatic discharge wrist strap, mat, and cord
Extension – 3/8" drive - 3", 6", 8"
File – 8" half round bastard, 8" mill, 8" round bastard
File card (cleaning brush)
File handles (3)
Flashlight and batteries
Gas welding goggles – adjustable
Gasket scraper
Gauge – feeler (flat and round)
Gloves – disposable, Nitrile
Grease gun
Hacksaw and blades (32 teeth per inch)
Hair dryer – 1800W
Hammer – ball peen, 8 oz.
HAZMAT storage
Hearing protection – ear muff or plug type
Knife – pocket
Magnet – telescopic
Mallet – rawhide or plastic
Marker – fine tip felt
Mask respirator – 1/2, particulate & vapor cartridges
Mechanical fingers
Mirror – inspection
Multimeter – digital, auto range
Network loopback plugs
Nut driver set
Oven
Pencil grinder – 90 degree
Pick set
Pliers – 8" channel lock, diagonal, duckbill, needle
nose, safety wire, 6" slip joint, 6" or 8" vise grip
Pliers set – snap ring
Plug – 1/4"
Power supply tester
Punch – automatic center
Punch and chisel set
Rivet set – AN 470-3, AN 470-4, AN 470-5 (flush
and #6)
Rubber gloves – thick
Ruler – pocket, 6"
Safety glasses/goggles
Safety wire stainless steel – 020, 031, 041
Sander – dual action, 6"
Saw – wet tile
Scale – digital
Screwdriver – 6" common, 8" common, 6" Phillips,
8" Phillips, stubby common
Socket drive (spark plug) - 7/8" deep thin wall
Sockets – swivel, 1/4" and 3/8" drive
Solder workstation
Speed handle – 3/8"
Square – combination
Straight edge – engineer's scale (6" or 12")
Thermal compound
Thermocouple plugs – mini K
Thermocouple wire – K type
Thermocouples
Tool box with lock (approximately 24" length, 12"
height, 12" width)
Vacuum base
Vacuum gauge – 0-30"
Vacuum hose/fittings – 6' by 1/4"
Vacuum pump
Valve core extractor – screwdriver type
Wire stripper/crimpers
Wrench set – Allen, 1/16" through 5/16"
Wrench set – angle and crow's foot
Wrench set – box open-end (12 point), 1/4" through
1", which must include an 11/32" wrench
Wrenches - ratcheting