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CHAPTER 10

SUPPORT EQUIPMENT

This chapter identifies support equipment (SE) used to handle, service, load, test, and maintain aircraft. As an airman apprentice, you will be required to operate SE. Some SE is used both ashore and afloat, while other SE is used only ashore or only afloat. The SE division of the Aircraft Intermediate Maintenance Department (AIMD) afloat and the Fleet Readiness Centers ashore is tasked with maintaining SE. Principal users of SE are the squadron line division, the base operations line division, supply, and the air department aboard aircraft carriers.

LEARNING OBJECTIVE

When you have completed this chapter, you will be able to do the following:

1. State the purpose and function of the types of support equipment, to include operation, maintenance, hazards, and carrier air and shore-based operations.
2. Explain the purpose for support equipment preoperational maintenance.
3. Define the support equipment training, licensing, and misuse-abuse.

TYPES OF EQUIPMENT

There are two types of support equipment—aircraft handling equipment and aircraft servicing equipment. The following text discusses these various types of support equipment.

HANDLING EQUIPMENT

Aircraft handling equipment consists of tow tractors; crash and salvage equipment, to include fire-fighting vehicles and maintenance cranes; forklift trucks; and flight deck scrubbers.

Tow Tractors

A/S32A-31A Aircraft Towing Tractor

The A/S32A-31A aircraft towing tractor (*Figure 10-1*) is designed for towing aircraft aboard ship. The drive system consists of a 3-cylinder diesel engine, automatic transmission, and rear-wheel drive with dual wheels. Front-wheel steering is power assisted and has seating for the driver only. Service brakes are hydraulic, power operated, wet-disc type with a mechanical hand brake for the rear wheels. A 24-volt electrical system provides starting, lighting, and instrumentation. Front- and rear-mounted pintles are used for aircraft towing. A universal jet-engine start unit mounts to the rear of the tractor.

Figure 10-1 — A/S32A-31A aircraft towing tractor.

A/S32A-32 Aircraft Towing Tractor

The A/S32A-32 aircraft towing tractor (*Figure 10-2*), also called "The Spotting Dolly," is designed to tow, turn, and position aircraft within the confines of an aircraft carrier hangar deck. It is powered by a 3-cylinder diesel engine, which drives two main hydraulic pumps. The hydraulic pumps supply fluid to drive motors that turn two open-chain reduction drives via two gearboxes at each main wheel, which operates independently. A mechanical wheel clutch handle is used to engage or disengage the drive wheels, enabling the tractor to pivot on a caster wheel around its center within a zero turning radius. A joystick control, next to the operator's seat, is an electromechanical device used to control the speed and direction of the spotting dolly's movement. The lift cylinder, which raises and lowers the lifting arms, and two spread cylinders, which keep the arms pinned against the aircraft nose gear, are powered by an auxiliary hydraulic pump. Several pairs of axle pins that engage both sides of the nosewheel are carried on the tractor and fit a variety of aircraft.

Figure 10-2 — A/S32A-32 aircraft towing tractor.

Interaction Available

Shipboard Helo Handler (SHH)

The shipboard helicopter handler (SHH) (*Figure 10-3*) is a highly maneuverable, low-profile, towbarless helicopter handling vehicle that replaces the current hangar bay spotting dolly and attaches to and lifts a helicopter's single-tail landing gear. When attached to the helicopter, it has the ability to rotate about the attachment to the tail landing gear with a zero turning radius to provide the maneuverability necessary to spot H-60s in a densely packed hangar bay environment. The SHH is low profile to permit compatibility with the H-60 during tail landing gear engagement and to facilitate transit underneath aircraft in the hangar bay when it is densely packed with aircraft.

Figure 10-3 — Shipboard helo handler (SHH).

Interaction Available

A/S32A-48 Large Land-Based Tow Tractor

The A/S32A-48 aircraft towing tractor (*Figure 10-4*) is an inline, 4-cylinder, diesel-powered, liquid-cooled, 4-wheel drive vehicle designed to move heavy, shore-based aircraft. The chassis incorporates a welded steel construction and steel unit body frame. A 2-seat, air-conditioned and heated enclosed cab is provided for operator comfort in all weather. The driver is positioned on the left-hand side of the vehicle, while passenger seating is on the right-hand side adjacent to the driver. Both seats are adjustable. Two 12-volt batteries, 24-volt, 70-amp alternator electrical system provides power for lighting, instrumentation, control panels, starter motor, switches, wipers/washer motor, and heater/defroster. The full-power shift transmission has four forward and one reverse speeds. The tractor's front and rear wheels' directional control is by 4-wheel coordinated steering. Service brakes are hydraulic, power operated, wet-disc type with a Self-Activating Hydraulic Release (SAHR) parking/emergency brake system. Ballasted, the tractor is capable of approximately 35,000 pounds of drawbar pull.

Figure 10-4 — A/S32A-48 large land based tow tractor.

A/S32A-45 Mid-range Tow Tractor (MRTT)

The A/S32A-45 mid-range tow tractor (*Figure 10-5*) is a 4-cylinder, diesel-powered, 3-speed automatic transmission, liquid-cooled, rear-wheel-drive tractor designed for towing aircraft weighing up to 80,000 pounds. The frame is a welded-steel, one-piece unit, with Brierton Dead Steer front axle with power-assisted front steering and has a 50-degree turning angle. An adjustable driver's seat is located on the left side of the vehicle, and a second seat is located on the right side for a passenger. Standard disc brakes are provided on the front wheels, and integrated hydraulic wet brakes are provided on the rear wheels. It employs a 12-volt, 800-cold-cranking-amp batteries consisting of spiral cell technology to supply power for the lights and accessories, horn, starter motor, ignition, and instrumentation. The mid-range tow tractor is geared to travel at a maximum speed of 15 mph forward and 7 mph in reverse with no towing load. Front- and rear-tow couplers (pintles) and tie-down attachments are provided.

Figure 10-5 — A/S32A-45 mid-range Tow Tractor (MRTT).

Crash and Salvage Equipment

Various salvage and maintenance cranes, firefighting vehicles, and Twinned Agent Unit (TAU-2H) extinguishers are discussed in the following text.

A/S32A-35A (CVCC) Aircraft Crash Handling and Salvage Crane

The A/S32A-35A aircraft crash handling and salvage crane (*Figure 10-6*) is a self-propelled, 4-wheel drive, 6-cylinder, liquid-cooled, turbocharged, diesel, electric-powered vehicle mounted on 6 pneumatic rubber tires. The ac generator is directly coupled to the engine and provides power to the drive motors, luff/hoist winch motor, auxiliary hoist/counterweight wench motor, and motor control systems. A hydraulic pump is directly coupled to the engine and provides fluid flow for steering, self-adjusting service brakes, and winch brake control. Vehicle steering is accomplished by hydraulic cylinders, which connect to the rear axle and main frame. The front and rear axles pivot in opposite directions, allowing significant turning capability. The crane main hoist has a static lift capacity of 75,000 pounds, and the crane auxiliary hoist has a lift capacity of 10,000 pounds.

Figure 10-6 — A/S32A-35A (CVCC) aircraft crash handling and salvage crane.

The crane is capable of operating aboard ship in inclement weather. It is designed to be stowed on the flight deck of an aircraft carrier, where it will be exposed to extreme weather and corrosive conditions. In service, the crane will lift crashed/damaged aircraft from various locations and attitudes and move loads on a rolling and pitching ship to a safe parking zone on the flight deck.

A/S32A–36A (AACC) Aircraft Crash Handling and Salvage Crane

The A/S32A-36A aircraft crash handling and salvage crane (*Figure 10-7*) is a 6-wheel, 4-wheel drive, liquid-cooled, turbocharged, diesel, electric-powered, self-propelled vehicle. Steering is hydraulically controlled via the front and rear wheels. Mid- and rear-axle drive motors provide traction power and have a 6-wheel, self-adjusting air/hydraulic brake system incorporated. Rear- and mid-dc-electric drive motors provide power for crane travel, while a separate dc electric motor provides power to the main hoist control or boom luff control. The crane has a maximum lift capability of 70,000 pounds and can be operated from the cab or by a remote pendant control.

Figure 10-7 — A/S32A-36A (AACC) amphibious assault ship crane.

The crane is capable of operating aboard ship in inclement weather. It is designed to be stowed on the flight deck of an aircraft amphibious assault ship, where it will be exposed to extreme open-sea weather conditions and the corrosive effects of a saltwater atmosphere. In service, the crane will lift crashed/damaged aircraft from various locations and attitudes and move loads on a rolling and pitching ship to a safe parking zone on the flight deck.

A/S32P-25 Shipboard Fire-Fighting Vehicle

The P-25 shipboard firefighting vehicle (*Figure 10-8*) is a 4-wheel (2-wheel drive), 6-cylinder, turbocharged, liquid-cooled, 24-volt, diesel-powered vehicle with a hydrostatic drive system that transmits power to the rear wheels. Steering is performed by a single hydraulic cylinder and tie-rod assembly that controls the front wheels. Dynamic vehicle braking is provided by the hydrostatic drive system. When the accelerator is released, the brakes automatically engage. Separate tanks within

the vehicle chassis carry 750 gallons of water and 55 gallons of aqueous film-forming foam (AFFF). Three 20-pound fire extinguishers containing bromochlorodifluoromethane (Halon 1211), a halogenated extinguishing agent, are stored on the right side of the vehicle. One nursing line connection on each side of the vehicle provides AFFF mixture from the ship's system directly to the vehicle's water pump.

Figure 10-8 — A/S32P-25 shipboard fire-fighting and rescue vehicle.

Interaction Available

The vehicle has seating for a crew of two. The driver compartment is located at the left-forward end of the vehicle and contains the main control panel for activating the firefighting systems. AFFF can be sprayed from both the forward turret nozzle and handline hose reel nozzle. These nozzles operate independently and can be used simultaneously to make this vehicle ready for firefighting duty.

A/S32M-19, Heavy Maintenance Crane (HMC)

Figure 10-9 — A/S32M-19, heavy maintenance crane (HMC) wheel mounted, 25-ton.

Interaction Available

The heavy maintenance crane, Part No. CD225 HMC (*Figure 10-9*), is a 25-ton, diesel-powered hoist maintenance vehicle. It has 4-wheel drive, 4-wheel steering capability, and a crane superstructure that revolves 360 degrees. The crane consists essentially of a diesel engine, transmission, drive axles, a hydraulic craning circuit, and a Rated Capacity Indicator (RCI) system. The hydraulic craning circuit is made up of a hydraulic pump and motors, valves, hoist, cylinders, piping, and superstructure that lifts and moves heavy loads from one location to another. The electrical circuit is 12 volts for starting, lighting, and instrumentation. The crane's primary purpose is to remove and replace aircraft

components in support of scheduled and unscheduled maintenance. This includes engines, transmissions, propellers, engine modules, and rotor blades.

Forklift Truck

The forklift truck (*Figure 10-10*) is a cantilever-type industrial truck, either gasoline, diesel (shipboard use), or electrically operated, and is used in the handling and lifting of palletized unit loads. It contains vertical uprights and an elevator backplate equipped with two or more forks of sufficient length and thickness for lifting pallets. The forklift truck is probably the most widely used power-driven piece of material-handling equipment for palletized loads aboard ship and in Navy industrial supply warehouses. When not on a hard surface, a forklift truck should have pneumatic tires to operate efficiently. Public works maintains forklifts on shore stations. Aboard carriers, the support equipment division of AIMD performs the maintenance.

Figure 10-10 — Forklift truck.

Flight Deck Scrubber

The flight deck scrubber (*Figure 10-11*) is designed to spray a cleaning solution onto the flight and hangar decks, scrub the deck, and recover the residual solution and debris for disposal. It consists of the debris hopper housing, two opposed rotation cylindrical brushes, a solution and recovery tank, and a vacuum recovery system and rear squeegee. Those are mounted on a driver-operated, 4-cylinder, 2-wheel drive, and diesel-engine power drivetrain. The purpose of having flight deck scrubbers aboard ship is to achieve and maintain a high degree of deck cleanliness, which contributes to a reduction of aircraft engine foreign object damage (FOD) and provides better traction, thereby improving personal safety during flight operations.

Figure 10-11 — Flight deck scrubber.

Interaction Available

SERVICING EQUIPMENT

Servicing equipment provides compressed nitrogen or air, electrical and hydraulic power, and air-conditioning for aircraft functions while the aircraft is on the ground. Mobile electrical power plants (MEPPs) supply electrical power for aircraft testing and maintenance and operate on shore stations

and aboard aircraft carriers. MEPPs have high maneuverability and mobility. On shore stations, MEPPs may be self-propelled, trailer-mounted, and/or require towing. The following text describes some of the servicing units you will see in the aviation community.

A/S37A-3 Shipboard Mobile Electric Power Plant (MEPP)

The A/S37A-3 shipboard MEPP (*Figure 10-12*) is designed to provide 115-volts alternating current (VAC), 3-phase, 400-Hertz (Hz) or 28-volts direct current (VDC) electrical power for aircraft aboard ship. The MEPP is a 4-wheeled, self-propelled vehicle powered by a 3-cylinder diesel engine. The engine drives the electrical generator and hydraulic propulsion system. A 24-VDC vehicle electrical system provides starting, lighting, and instrumentation. The variable displacement axial piston pump provides hydraulic pressure to two gear pumps that drive the rear wheels. Power steering is provided to the front axle for ease of vehicle movement in congested areas on the flight deck and hangar bay. The ac and dc power cables are stored in a compartment near the driver. They deliver 115 VAC, 3-phase, 400-Hz, or 28-VDC electrical power to the aircraft. All controls, propulsion direction shifter, parking brake, and electrical power are located on right-hand side of operator's seat. The MEPP is designed for air transport and is provided with tie-down rings and forklift channels.

Figure 10-12 — A/S37A-3shipboard mobile electric power plant.

NC-10C and A/M32A-108 Mobile Electric Power Plant (MEPP)

The NC-10C (*Figure 10-13*) is a trailer-mounted, self-contained power plant designed for shore-based facilities. It supplies electrical power for servicing, starting, and maintaining aircraft. The NC-10C has a 6-cylinder diesel engine, whereas the A/M32A-108 has a 4-cylinder diesel engine, both are 2-cycle with water-cooled components. Both units have ac and dc generators, enclosed in a removable steel housing. The ac and dc power cables are stored on spring-loaded reels next to the control panel and deliver 115/200-volt, 3-phase, 400-Hz ac, and 28-volt dc electrical power. A tow bar for towing and steering, tie-down rings, fire extinguisher, hinged doors for operation, and manual hand brake are provided.

Figure 10-13 — NC-10C and A/M32A-108 mobile electric power plant.

A/M24M-5 Static Frequency Converter

The static frequency converter (SFC) (*Figure 10-14*) is a 4-wheeled, not self-propelled vehicle and must be towed or moved manually. It is equipped with tie-down rings, pneumatic tires, a mechanical hand brake, and a tow bar for towing and steering. It is designed for flight deck conditions as well as land-based theaters. The SFC consists of two major assemblies: the trailer assembly and the converter assembly. Input power is provided from shipboard and shore-based receptacles that supply an external power source of 440/220-VAC, 3-phase, 60/50-Hz, ungrounded. The SFC converter assembly automatically senses either 440-VAC or 220-VAC input. The input phase rotation is insensitive and will operate normally when rotation is in either direction. The SFC converts the input power and provides converted power via four 30-foot cables providing 115-VAC, 3-phase, 400-Hz, 270-VDC, and 28-VDC providing electrical power to aircraft/equipment aboard ship or shore.

Figure 10-14 — A/M24M-5 static frequency converter.

MSU-200NAV Air Start Unit

The MSU-200NAV air start unit (MSU) is designed to provide for aircraft main engine start (MES) and to supply onboard environmental control systems (ECS) with compressed air. The MSU delivers sufficient bleed air to start the main engines of all aircraft whose requirements are within the performance range of the unit. The MSU comes in two variations. In the land based (*Figure 10-15*), the MSU is mounted on an MSU trailer, A/M32U-16A. When installed on the trailer, the unit's display/control panel (DCP) is mounted on the enclosure, and the fuel for the MSU is supplied by a fuel cell mounted on the trailer. In the shipboard configuration (*Figure 10-20*), it is installed on a shipboard tow tractor (STT) using a special MSU L-frame assembly. The DCP is positioned at the tractor driver's location and fuel is provided by the fuel tanks. The intake air required for the operation of the MSU is drawn in through the air intake grill on the left side of the enclosure (ship configuration) and forward part of the enclosure (shore-based configuration) and then drawn into compressor compartment. The intake air grill can be closed with the sliding door and a switch is installed on the door, which precludes operation of the MSU unless the sliding door is fully opened. The MSU-200NAV is equipped with a sophisticated internal built-in test equipment (BITE)

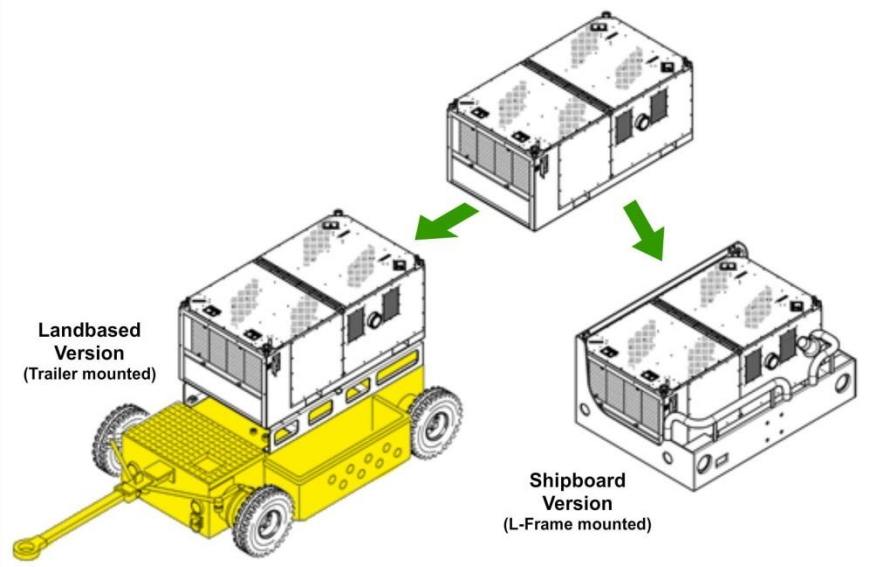


Figure 10-15 — MSU-200NAV air star unit, A/U47A-5 mounted on MSU trailer A/M32U-16A (land based configuration).

and full authority digital engine control (FADEC) system that checks all electrical sensors and valves for proper operation prior to starting the unit and supervises the operating data and its limits during startup and operation. Depending on the failure and the operating mode, the unit will be shut down and faults will be displayed in plain text on the DCP. A storage compartment for the pneumatic starter duct is located on both configurations of the MSU carrying platform.

You must take extra special precautions as to where an air-start unit (ASU) is positioned during operation, especially aboard ship where aircraft are parked closely together. High volume air pressure, extreme exhaust temperatures, jet intake suction, high noise levels, and unqualified operators are all potential hazards.

WARNING

Hot exhaust from a jet aircraft start unit is a serious hazard when operating in close proximity to aircraft, aircraft components, fuel, weapons, equipment, and personnel.

A/M27T-14 Electrical Hydraulic Power Supply (EHPS)

The A/M27T-14 electrical hydraulic power supply (EHPS) (*Figure 10-16*) is a single-system, hydraulic-pumping unit with a rated capacity of 32 gallons per minute (gpm) at 3000 pounds per square inch (psi) and 22 gpm at 5000 psi. The EHPS is a self-contained unit designed to check performance and operating characteristics of aircraft hydraulic systems. The unit delivers hydraulic fluid at controlled pressures without the necessity of starting the aircraft engines.

Figure 10-16 A/M27T-14 electrical hydraulic power supply (EHPS).

The EHPS electric model employs a 75-hp, 440/460-VAC, 3-phase, 60-Hz induction-type electric motor, which is used and directly coupled to the main hydraulic pump. The hydraulic system has a fluid reservoir with a usable capacity of 25 to 28 gallons that feeds the hydraulic pump. The hydraulic pump system contains a boost pump and a high-pressure pump. The hydraulic hoses, tubing, and fittings route hydraulic fluid through an oil cooler and low- and high-pressure filters to the outlet ports. External hoses (high pressure and return) are used to connect the EHPS to the aircraft being tested. Relief valves prevent damage to aircraft's/EHPS's hydraulic system components. A pressure compensator and control valves allow control of hydraulic pressure. Operator controls and indicators are mounted on the instrument panel and main manifold and are accessible through the instrument panel access door. Additional controls and indicators are accessed through other access doors on the base/housing assembly. The EHPS is a 4-wheeled, not self-propelled vehicle and must be towed or moved manually. It is equipped with tie-down rings, pneumatic tires, a mechanical hand brake, and a tow bar for towing and steering.

A/M27T-15 Diesel Hydraulic Power Supply (DHPS)

The A/M27T-15 diesel hydraulic power supply (DHPS) (*Figure 10-17*) is similar in operation to the A/M27T-14 except for its source of power. The A/M27T-15 is powered by a 4- cylinder, 4-cycle turbocharged diesel engine. During normal operation, the diesel engine operates at 2100 revolutions per minute (rpm). The engine is directly coupled to the main hydraulic pump assembly. The electrical system consists of two 12-volt maintenance-free batteries to power the 24-VDC electrical system. During initial start up of the DHPS, battery current energizes the starter motor to crank the diesel engine. During normal operation, the alternating current is used to power the various lights, controls, cooling fans, and indicators on the DHPS control panel and keeps the batteries fully charged. A warning alarm alerts to a fault condition before damage to unit occurs. Like the EHPS, the DHPS is a 4-wheeled, not self-propelled vehicle and must be towed or moved manually. It is equipped with tie-down rings, pneumatic tires, a mechanical hand brake, and a tow bar for towing and steering.

Figure 10-17 A/M27T-15 diesel hydraulic power supply (DHPS).

A/U26U-1 Oxygen Servicing Unit

The A/U26U-1 oxygen-servicing unit (*Figure 10-18*) is used to replenish oxygen storage cylinders and emergency bailout oxygen systems, which are installed in aircraft. The trailer has two fixed wheels and a retractable, rotatable caster wheel for movement by hand or towed by a tow tractor. The unit contains a nitrogen module, oxygen module, and three cylinders of gas. Two cylinders of nitrogen are used to drive the boost pump, and one cylinder of oxygen is used for servicing. The modules contain the gas pressure and flow controls, boost pump, connectors, and safety devices within a protective case.

Figure 10-18 — A/U26U-1 oxygen servicing unit.

A/M26U-4B (NAN-4) Nitrogen Servicing Unit

The A/M26U-4B (NAN-4) nitrogen-servicing unit (*Figure 10-19*) provides a mobile source of compressed nitrogen to recharge aircraft nitrogen systems. It consists of a welded steel frame, 2-wheel axle, a front-retractable caster wheel, drawbar coupler ring for towing, tool and storage boxes, six compressed gas cylinders, and a manual hand brake. Nitrogen under pressure is transferred from the NAN-4 to the aircraft through a series of gauges, valves, manifold, filters, pressure regulator, and hoses. It is equipped with a boost pump that is capable of boosting nitrogen supply pressure up to a maximum of 3500 psi.

Figure 10-19 — A/M26U-4B nitrogen servicing unit.

TMU-70 low-loss, closed-loop, liquid oxygen storage tank

The TMU-70 (*Figure 10-20*) is a completely self-contained unit composed of three major components: a 50-gallon storage tank, a 15-liter transfer tank, and a system of transfer lines and control valves. The three components are permanently mounted on a portable 3-wheel trailer. The trailer is equipped with a manually operated parking brake system and retractable caster wheel. The storage and transfer tanks have liquid level, pressure gauges, and pressure-relief devices.

Figure 10-20 — TMU-70 low-loss, closed-loop, liquid oxygen storage tank.

Mobile Air-Conditioning Units

Most modern aircraft are crammed with electronic equipment that generates tremendous amounts of heat and makes air-conditioning a requirement in the air and on the ground. Air-conditioning is normally provided by an onboard system, but the aircraft engines must be operating for the system to work. When on the ground, electronic equipment must run for long periods of time for maintenance, testing, or calibration. Therefore, some other means of air-conditioning is needed, and that is the purpose of mobile air-conditioning units.

A/M32C-23 Large-Land-Based Air-Conditioner (LBAC)

The A/M32C-23 large-land-based air-conditioner (LBAC) (*Figure 10-21*) is a mobile, 4-wheel, trailer-mounted, self-contained, 6-cylinder diesel powered unit coupled to three 15-ton scroll-type compressors that provides air-conditioned, dehumidified, or vented (ambient) air through a standard 8-inch ring, collapsible air-ducting hose to the aircraft's electronic equipment or cockpit/cabin areas during ground maintenance. The LBAC consists of a generator engine set (GENSET) rated at 211 kilowatts (kw), 480-VAC, 60-Hz at 1800 rpm, and operating controls for air-conditioning and heating systems. The amount of air-conditioning can be adjusted at the control panel. In low speed (30 Hz), a single compressor can output as little as 5 tons of air-conditioning. At high speed (90 Hz), each compressor can output 15 tons for a total of 45 tons of air-conditioning at a discharge temperature between 40 and 65 degrees Fahrenheit. The tertiary compressor (COMP-3) is activated first. If additional cooling is required, the secondary compressor (COMP-2) is activated, followed by the primary compressor (COMP-1). Each is activated in turn as the demands for additional cooling increase. The chassis has towing and Ackerman-type steering and manually operated parking brake. The LBAC is designed for air transport and is provided with tie-down/lifting rings and forklift channels.

Figure 10-21 — A/M32C-21 air-conditioner.

Interaction Available

A/M32C-21 Air-Conditioner

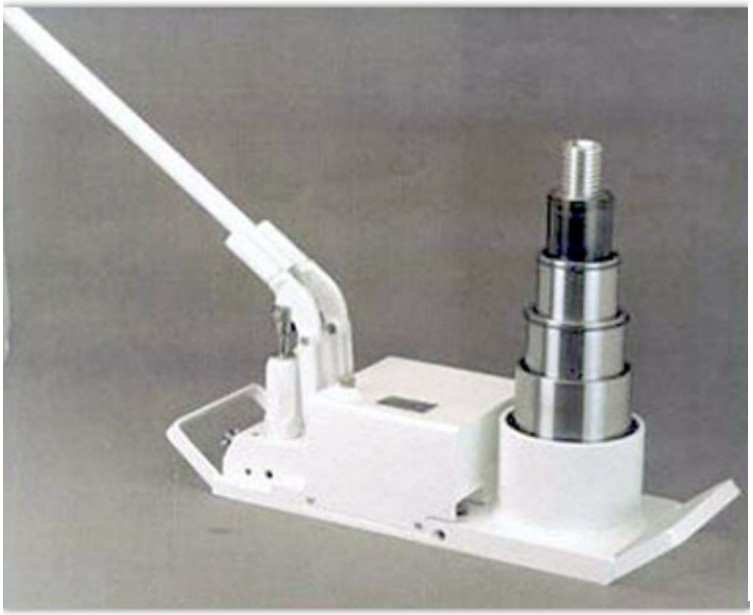
The A/M32C-21 air-conditioner (*Figure 10-22*) is a mobile, 4-wheel, trailer-mounted, electrically powered, self-contained unit powered by a 30-hp, 440-volt, 3-phase, 60-Hz ac electric motor that is an integral part of the 6-cylinder reciprocating-type compressor. A 30- to 50-foot external power cable, a 30-foot collapsible duct hose for aircraft connection, a collapsible tow bar for towing and steering, tie-down rings, and a manual parking brake are provided.

Figure 10-22 — A/M32C-23 land based air conditioner (LBAC).

Hydraulic Jacks

Hydraulic jacks are frequently used in aircraft maintenance. Maintenance of the tires, wheels, brakes, and struts requires part or all of the aircraft to be lifted off the deck. The entire aircraft must be lifted off the deck to perform operational testing of the landing gear.

Different types and sizes of hydraulic jacks are needed. Some typical hydraulic jacks are described in the following paragraphs. The basic types are illustrated in *Figure 10-23*.



Axle Jack

Figure 10-23 — Hydraulic jacks, aircraft axle jacks, and aircraft tripod jacks.

Interaction Available

Aircraft Axle Jacks

The aircraft axle jack (*Figure 10-23*) is a portable, self-contained, hydraulically operated unit. These jacks are used to raise the landing gear wheels off the deck to perform maintenance operations. The lift, a component of the base of the jacks, consists of three rams and an outer cylinder. A rectangular tank welded to the base forms the fluid reservoir.

Aircraft Tripod Jacks

The aircraft tripod jack (*Figure 10-23*) is a portable, self-contained, hydraulically operated jack. These jacks are used for raising the wing, nose, or tail of an aircraft. When used in sufficient numbers and at the required jacking points, this jack can lift the complete aircraft off the deck. The jack consists of three main assemblies: a hydraulic cylinder, a tubular steel tripod leg structure with caster wheels, and a hydraulic pump assembly. The cylinder and ram are raised by manually operating the hydraulic pump.

Maintenance Platforms

Performing maintenance on aircraft does not always occur at ground level and often requires the use of a maintenance platform. There are several different models to use depending on type of aircraft, the maintenance requirement, and location. Two common maintenance platforms are the B-1 maintenance platform and the B-4 maintenance platform.

Figure 10-24 — B-1 maintenance platform.

Interaction Available

B-1 Maintenance Platform

The B-1 maintenance platform (*Figure 10-24*) is a fixed height, 10-foot lower structure, a variable-height upper structure, and a manual pump-actuated hydraulic system for raising and lowering the upper structure. The

upper structure includes a work platform with guardrails and steps with handrails. The lower structure includes fixed steps and handrails, a towbar, and four free-swivel caster wheels with safety locking devices, four immobilizing jacks, and a hydraulic pump, lines, and reservoir. The height range for the B-4 work platform is from 13 feet to 20 feet, and it has a weight-bearing capacity of 600 pounds.

B-4 Maintenance Platform

The B-4 maintenance platform (*Figure 10-25*) is a moveable, hydraulically operated, adjustable platform with a ladder assembly. Four free-swivel caster wheels, each having a foot-lever actuated mechanical brake and swivel lock mechanism, are included. The platform is equipped with safety guardrails; handrails for the ladder; and two safety-lock pins, which are inserted into the frame to lock the extension scissors of the platform. A hydraulic hand pump with reservoir is provided for raising and lowering the platform. The adjustable height range for the B-4 work platform is from 3 to 7 feet and a weight-bearing capacity of 600 pounds.

Figure 10-25 — B-4 maintenance platform.

Interaction Available

MAINTENANCE REQUIREMENTS

You, as an airman apprentice, are not responsible for maintaining support equipment, unless you are striking for aviation support equipment technician. You will, however, be required to operate support equipment and perform preoperational maintenance. Preoperational maintenance is like checking your automobile before you drive it; that is, checking your oil, tire pressure, battery, radiator, and so forth.

The point is, if the support equipment unit has developed a problem, return it to the support equipment shop. Let the technicians work on it. They have had the training. Most support equipment is dangerous. The MEPPs, for instance, produce 1000 amps, which is more than enough to electrocute you. Hydraulic units have working pressures as high as 5000 psi. You do the operating, and leave the maintenance to the technicians.

The three levels of naval aviation maintenance are organizational, intermediate, and depot. Organizational maintenance is the general upkeep of aircraft that is performed by aviation squadrons. Intermediate maintenance is performed at FRCs/AIMDs, and includes component inspection, disassembly, repair, reassembly, testing, and fabrication. Depot-level maintenance is normally the complete repair of the entire aircraft and systems. You will most likely be concerned with the organizational level.

Preoperational Maintenance

Preoperational maintenance is performed by organizational and intermediate maintenance personnel. A preoperational card is used to inspect support equipment prior to its use. All support equipment you operate will have a preoperational card specific to the type of equipment. The card is easy to use and must be completed in the numerical sequence, and it must be accomplished prior to the first use of the day and any use thereafter. All types of support equipment require a preoperational check before

each use. The preoperational card does not state how to repair, make adjustments, or correct defective conditions. These functions are performed in FRC/AIMD.

QUALIFICATIONS FOR OPERATING SE

As a direct result of support equipment accidents, the Navy established a Support Equipment Operator Training and Licensing Program. The purpose of the program is to make sure you receive effective training in the safe and efficient operation of specific aircraft support equipment, as prescribed in the *Naval Aviation Maintenance Program (NAMP), COMNAVAIRFORINST 4790.2 (series)*. You cannot, without great risk, properly or safely move, secure, service, or maintain an aircraft using support equipment unless you are completely trained and qualified on both the support equipment and the aircraft.

Training

The SE Operator Training and Licensing Program has two distinct parts—Phase 1 and Phase 2. Phase 1 covers the support equipment, and Phase 2 covers the operation or use of the support equipment on a specific type of aircraft. You get your Phase 1 training from AS ratings at the support equipment school sponsored by FRC/AIMD. This school covers daily pre/post-operational inspections, safety, appropriate gear, and operating procedures on each specific type of equipment. Phase 2 training is handled by your own squadron or unit. Usually, the program is managed by the line division and monitored by quality assurance (QA). This is practical on-the-job training, relating what you learn in support equipment school with actual aircraft handling, servicing, or maintenance. While in Phase 2 training, you are under the direct supervision of a qualified and licensed operator of the support equipment you are using.

Licensing

Once you complete training, you are eligible for a USN Aviation Support Equipment Operator's License, commonly known as a "yellow license." This license is required to check out certain types of support equipment from the FRC/AIMD support equipment division and/or to operate the support equipment. When you complete Phase 1, a certificate of completion is issued to your unit. It certifies completion of Phase 1 training only and does not authorize you to operate any given piece of support equipment. When you complete Phase 2 training in your unit, you are issued your "yellow license," which is signed by your commanding officer (or the aircraft maintenance officer if he/she is so authorized in writing by the commanding officer). Your "yellow license" is good for 3 years from the date issued for each specific type of support equipment and aircraft. After 3 years, you must requalify. If you transfer to a new outfit with different types of aircraft, your license is not valid. You must requalify under Phase 2 training for the new types of aircraft and be issued a new license.

Misuse/Abuse

Your commanding officer has the responsibility to revoke your yellow license under the following conditions:

- You display unsafe operator habits or behavioral traits that constitute unsafe or abusive use of support equipment.
- Your State Motor Vehicle Operator's License becomes invalid (applies to self-propelled support equipment only).
- You intentionally misuse or abuse support equipment. Once your “yellow license” has been revoked, you must go through the entire Phase 1 and Phase 2 training to requalify for a new license.

Local misuse or abuse forms are generally available and may be submitted by anyone witnessing misuse or abuse regardless of the command to which the person is attached. It is common practice

aboard stations for the support equipment division to have roving patrols to observe and report misuse, abuse, and discrepancies in all areas and spaces where support equipment is used. Reports can, and do, result in disciplinary action for improper operation, negligence, or vandalism.

NOTE

For additional information concerning support equipment (SE) training, licensing, and misuse/abuse, refer to *Naval Aviation Maintenance Program (NAMP), COMNAVAIRFORINST 4790.2 (series).*

End of Chapter 10

Support Equipment

Review Questions

10-1. How many types of SE are there?

A. One
B. Two
C. Three
D. Four

10-2. What SE is a highly maneuverable, low-profile, towbarless helicopter handling vehicle that replaces the current hangar bay spotting dolly and attaches to and lifts a helicopter's single-tail landing gear?

A. A/S32A-31A
B. A/S32A-32
C. SHH
D. HSS

10-3. What SE is an inline, 4-cylinder, diesel-powered, liquid cooled, 4-wheel drive vehicle designed to move heavy, shore-based aircraft?

A. A/S32A-31A
B. A/S32A-32
C. A/S32A-45
D. A/S32A-48

10-4. What SE is an aircraft towing tractor, also called "The Spotting Dolly," and is designed to tow, turn, and position aircraft within the confines of an aircraft carrier hangar deck?

A. A/S32A-31A
B. A/S32A-32
C. A/S32A-45
D. A/S32A-48

10-5. What SE is a mid-range tow tractor with a 4-cylinder, diesel-powered, 3-speed automatic transmission, liquid cooled, rear-wheel-drive tractor designed for towing aircraft weighing up to 80,000 pounds?

A. A/S32A-31A
B. A/S32A-32
C. A/S32A-45
D. A/S32A-48

10-6. What SE is an aircraft crash handling and salvage, self-propelled, 4-wheel drive, 6-cylinder, liquid-cooled, turbocharged, diesel electric-powered vehicle mounted on 6 pneumatic rubber tires?

A. A/S32A-35A
B. A/S32A-32
C. A/S32A-45
D. A/S32A-48

10-7. What SE is a shipboard mobile electric power plant (MEPP) designed to provide 115 VAC, 3-phase, 400-Hz or 28-VDC electrical power for aircraft aboard ship?

A. A/S32A-35A
B. A/S32A-32
C. A/S37A-3
D. A/S32A-48

10-8. All support equipment you operate will have what type of card specific to the SE?

A. Non-operational
B. Operational
C. Post-operational
D. Pre-operational

10-9. What phase of the SE training program do you receive training from AS ratings at the support equipment school sponsored by FRC/AIMD?

A. 4
B. 3
C. 2
D. 1

10-10. What phase of the SE training program covers the operation or use of the support equipment on a specific type of aircraft?

A. 2
B. 3
C. 4
D. 5

10-11. Who has the responsibility to revoke your yellow license under the condition that you intentionally misuse or abuse support equipment?

A. AMO
B. CO
C. DO
D. XO

10-12. Who performs preoperational maintenance?

A. Organizational and intermediate administrative personnel
B. Organizational and intermediate maintenance personnel
C. Intermediate and civilian administrative personnel
D. Intermediate and civilian maintenance personnel

RATE TRAINING MANUAL – User Update

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