UNITED STATES MARINE CORPS
Utilities Instruction Company
Marine Corps Engineer School
PSC Box 20069
Camp Lejeune, North Carolina 28542-0069

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STUDENT HANDOUT

PLAN FIELD LAUNDRY FACILITY, OPERATION

1. **LEARNING OBJECTIVES:**

a. **Terminal Learning Objectives**:

(1) Provided a mission, a bare base laundry system, generator set personnel, supplies, and references, direct bare base laundry facility installation/operation. The bare base laundry facility will be directed so that laundry service is provided to the number of personnel and facilities in the mission per the references. (1169.02.05)

(2) Provided a mission, a utilities site reconnaissance report, and the reference, plan field laundry operation. The field laundry operation will be planned so that it will provide laundry support of the number of personnel and facilities per the references. (1169.04.13)

b. **Enabling Learning Objectives:**

(1) Given an operation order, camp layout, T/E and T/O, with the aid of references, while conducting a military brief, orally explain the bare base laundry facility requirements needed to support the operation plan in accordance with TM-01243E-14/1 and TM-08444A-15/1 (1169.02.05a)

(2) Given an operation order, camp layout, T/E and T/O, with the aid of references, list in writing the quantity of bare base laundry facility needed to support the operation plan in accordance with TM-10006A-14&P/1. TM-01243E-14/1 and TM-08444A-15/1 (1169.04.13a)

(3) Given an operation order, camp layout, T/E and T/O, with the aid of references, list in writing the amount of personnel required to operate the bare base laundry facility to support the operation plan in accordance with TM-01243E-14/1 and TM-08444A-15/1 (1169.04.13b)

(4) Given an operation order, camp layout, T/E and T/O, with the aid of references, list in writing the support requirements for the bare base laundry facility to support the operation plan in accordance with TM-01243E-14/1 and TM-08444A-15/1 (1169.04.13c)

(5) Given an operation order, camp layout, T/E and T/O, with the aid of references, list in writing the safety precautions required for the bare

base laundry facility to support the operation plan in accordance with TM-01243E-14/1 and TM-08444A-15/1 (1169.02.05b)

(6) Given an operation order, camp layout, T/E and T/O, with the aid of references, list in writing the task requirements for the bare base laundry facility to support the operation plan in accordance with TM-01243E-14/1 and TM-08444A-15/1 (1169.02.05c)

BODY

1. **Laundry Facility Characteristics and Capabilities:**

a. The Bare Base Laundry Facility consists of two platform assemblies that makes up the base or flooring for the unit. The platforms provide mounting for the 8 major components:

(1) Electrical panel.

(2) Washer.

(3) Extractor.

(4) Dryer.

(5) Air compressor.

(6) Water supply pump.

(7) Clothes bin.

(8) M-8O water heater to provide hot water.

b. The necessary interconnecting cables and hoses are included. External power to operate the Bare Base Laundry facility is provided by a separate power source capable of delivering **60 cycle, 3 phase, 208 VAC power. One laundry unit uses 10 kw of power. A 10 KW Gen set (MEP 003) is the minimum required for operation.**

c. In full operation, properly attended, one unit is capable of processing approximately **436 people or 2,400 lbs a laundry per day. Based on 20 hours of operation and 5.5 lbs. of laundry per man.**

2. **Description of Components:**

a. Electrical Panel. The electrical panel provides power distribution from a separate generator to the components of the laundry facility. The panel includes the necessary circuit breakers and receptacles for the water heater, water pump, and connecting plugs used to power the facility components. An electrical fire extinguisher is also mounted on the panel.

b. Control panel. The control panel consists of various switches and valves used to control numerous operational functions.

(1) Auto/Manual:

(a) Enables Program Timer switches in the “Auto” position.

(b) Enables the Door Unlock switch in the "Off" position.

(c) Enables the control switches in the "manual" position.

(2) Manual Water Level: The "HIGH" or "LOW" water level is determined by the weight of the load or wash cycle.

(a) Water level for washing cotton clothing is 8 inches. The manual water level switch must be placed on LOW to allow 8 inches of water into the washer.

(b) Water level for washing wool clothing is 11 inches. The manual water level switch must be placed on HIGH to allow 8 inches of water into the washer.

(c) Water level for all rinse cycles is 11 inches.

(3) Supply 1: In the manual position, enables the control solenoid to allow water to flow into supply cup #1. Supply cup #1 holds 6 oz of detergent.

(4) Supply 2: In the manual position, enables the control solenoid to allow water to flow into supply cup #2. Supply cup #2 holds 3 oz of detergent.

(5) Supply 3: In the manual position, enables the control solenoid to allow water to flow into supply cup #3. Supply cup #3 holds 2 oz 0f detergent.

(6) Supply 4: In the manual position, enables the control solenoid to allow water to flow into supply cup #4. Supply cup #4 holds 2 oz of fabric softener or bleach.

(a) The supply cup assembly is connected to the washer.

NOTE: 11 OZ OF DETERGENT IS USED PER 60 LBS OF LAUNDRY. 2 OZ OF FABRIC SOFTENER IS USED PER 60 LBS OF LAUNDRY.

(7) Hot Water: In the manual position, enables the control solenoid to allow an air supply to control the hot water inlet valve.

(8) Cold Water: In the manual position, enables the control solenoid to allow an air supply to control the cold water inlet valve.

(9) Drain: In the manual position, enables the control solenoid to allow an air supply for activation of the air drain valve.

(10) Cool Down: When placed in the manual position, cold water is injected into the wash to accelerate the cool down cycle.

(11) Run/Stop: When this knob is placed in the "RUN" position, a one RPM drive motor is turned on which starts the movement of the program card. This switch is only used in the automatic mode of wash.

(12) Program Timer Control Functions:

(a) Track 1: Activates and controls the water injection valve for supply cup #1.

(b) Track 2: Activates and controls the water injection valve for supply cup #2.

(c) Track 3: Provides power to the master relay unit coil through the Auto/Manual switch. When the track is cut, it turns the machine "OFF" after completion of the wash cycle.

(d) Track 4: Activates the solenoid which controls air to the hot water valve.

(e) Track 5: Activates the solenoid which controls air to the cold water valve.

(f) Track 6: Activates and controls the water injection valve for supply cup #3.

(g) Track 7: Activates the cold water level inlet valve for automatic cool down.

(h) Track 8: Activates and controls the water injection valve for supply cup #4.

(i) Track 9: When the chart is cut, power is transferred from one water level to the other. When the chart is cut the "High Level" position is connected. If no cut is made, the "Low Level" position is connected.

(j) Track 10: Unused.

(k) Track 11: Activate the solenoid which controls air to the drain valve when the chart is cut.

(l) Track 12: Unused.

c. Washer. A heavy duty washer is powered by an externally mounted motor, drive train and control unit.

(1) The washer is controlled either automatically or manually and has a 60 pound load capacity. Two 60 pound loads can be washed per hour.

(2) The automatic operation is provided by a programmable control card to regulate all functions of the laundry cycle. These functions are

the number of washes and rinses, water level, and water temperature. Automatic dispensing of supplies are also provided. Cards to operate the controller are pre-punched with standard cycles.

(3) Manual operation has a variable wash time of up to 30 minutes, however; should include three consecutive wash cycles of at least 5 minutes each followed by 3 consecutive rinse cycles of 2 minutes each. Majority of all washing is done in the manually

(4) The maximum water temperature should be 130 degrees F when washing cotton clothing and 100 degrees F when washing wool clothing.

NOTE: 20 HOUR DAY X 120 LBS. HR = 2,400 LBS OF LAUNDRY
2,400 LBS. DIVIDED BY 5.5 LBS. PER PERSON = 436 PERSON

WEIGHT OF WASHABLES IS LOCATED IN THE TECHNICAL MANUALS.

d. Extractor. The extractor uses centrifugal force to extract water prior to the drying process. It is powered by a 3 HP motor coupled through a fluid drive.

(1) The extractor control has a ten minute variable timer.

(2) The extractor load capacity is 20 pounds, 20 loads an hour can be extracted at an optimum of 3 minutes per load.

e. Dryer. A heavy duty dryer is powered by an externally mounted motor and drive train.

(1) The dryer load capacity is 30 pounds, 4 loads an hour can be dried at an optimum of 15 minutes per load.

(2) Air is heated by a fuel fired air heater mounted on the dryer. The maximum dryer temperature for drying cotton items is 200 degrees F. The maximum temperature for drying wool items is 130 degrees F. **The dryer uses 2.25 gallons of diesel fuel per hour.**

f. Air Compressor. The air compressor provides air pressure for the operation of the washer water intake and drain valves. The adjustable range of compressed air is 20 to 40 pounds per square inch (psi) during normal operation.

g. Water supply Pump. A portable, centrifugal type water pump is mounted in a carrying frame. The pump is mounted on the right platform for transportation and storage. The pump will deliver 18 to 20 gallons of water per minute.

h. Clothes Bin. The clothes bin is a metal container mounted on wheels which moves the laundry from the washer to the extractor. It has a drain to dispose of excess water.

i. Water Heater. The M-80 hot water heater is a self-contained fuel-fired water heater that can be used to provide heated water to the washer. It is located away from the laundry facility near the fuel source and water pump during use. **The M80 water heater uses 5 gallons of diesel fuel per hour.**

3. **Laundry Section:**

a. The mission of the laundry section is to provide laundry services for personnel operating in the field.

b. Laundry Section Personnel

(1) Laundry NCOIC: The laundry NCOIC directs the laundry section.

(2) Assistant NCOIC: The assistant NCOIC assists the NCOIC in the operation of the laundry section.

(3) Three Operators: Their tasks consist of the operation of the washer, extractor, dryer, the processing of laundry, and the repair and maintenance of the Bare Base Laundry Facility.

4. **Laundry Section Work Flow:**

a. The flow of laundry is usually based on bulk and organizational turn-ins.

(1) Bulk laundry consists of clothing and textile items to be laundered for return to stock or repair.

(2) Organizational laundry consists of clothing and individual equipment submitted in bulk to the laundry section by a unit or organization.

b. Receiving Laundry Turn-Ins.

(1) The supported unit delivers its soiled laundry to the laundry section receiving area.

(2) Check the NCOIC’s laundry schedule to find out what unit is making the turn-in.

(3) Determine what type of laundry turn-in is being made. (BULK OR ORGANIZATIONAL LAUNDRY)

(4) Classify the laundry turn-ins.

(1) Take all items, shake pieces loose, sort, and separate in baskets as follows:

(a) (White) cottons

(b) (Colored) cottons

(c) (Light) woolens

(d) (Dark) woolens

(e) Utility blouses

(f) Utility trousers

(5) The soiled laundry is then placed in canvas baskets and delivered to the laundry facility to be washed and dried.

(6) When the laundry section is supporting units in the field, production estimates may be required by higher headquarters. Therefore, an accurate production estimate and the weight of individual items of clothing and equipment must be known. The **DA 1974** form is used to show the correct amount of laundry received by the laundry section. It must show the date, organization, and correct amount of laundry received by the laundry section. This form is made in duplicate, one for the unit turning in the laundry and one for the laundry section.

NOTE: A LOGBOOK CAN BE USED TO KEEP AN ACCURATE COUNT OF UNIT TURN-INS AND PRODUCTION ESTIMATES.

(7) Once the laundry has been washed and dried it will be placed in canvas baskets and delivered to the shipping area.

(8) At the shipping area the laundry is sorted and packed in laundry bags for the supported unit to pick up.

5. **SITE SELECTION**

a. The site should be located on firm, flat, level, well drained ground that will support the laundry facility and vehicles in any weather. Adequate space must be available for tentage, vehicle parking, and laundry operations.

b. The laundry site must be located near a plentiful supply of clean water since about **500 gallons of water an hour** is required for each laundry section.

c. The site selected should be accessible to a traveled route or road network. An internal road network must be established to provide a smooth flow of vehicles in and out of the area.

d. A site should be selected which provides natural protection from attack and provides maximum concealment from observation.

6. **Personnel requirements**:

a. It will require a minimum of two operators to install the bare base laundry facility. Once the units are set up it will only require one operator to operate the facility.

7. **SUPPORT REQUIREMENTS**:

Requirements	Qty	Purpose
Generator (10KW or above)	1 ea.	Provides electrical power.
Medium GP tent	1 ea.	Provides shelter.
Laundry Detergent	1 drum (100 lbs.)	Detergent
Sour	1 drum (30 lbs.)	Fabric softener
5 gallon can/55 gallon drum	2 ea.	Fuel storage.
Diesel		Primary fuel source
JP-4		Secondary fuel source
LVS/5-Ton	1 ea.	Provides transportation
Tram	1 ea.	To load and unload.
GAA grease	AR	Provides lubrication
Lubricating oil OE-30	AR	Provides lubrication
Lubricating oil GO 80/90	AR	Provides lubrication

NOTE: NO SPECIAL TOOLS ARE NEEDED TO SETUP, OPERATE, AND MAINTAIN THE LAUNDRY FACILITY.

8. **SAFETY PRECAUTIONS.**

a. Ensure that the eight grounding rods/wires are installed near the corner of each platform. The control panel is not equipped with no fault breakers.

b. Verify that a serviceable electrical fire extinguisher is located on the side of the electrical control panel.

c. Ensure that you have good drainage.

d. All waste water should directed down stream from the water point and camp sites.

9. **FACTORS TO CONSIDER WHEN PLANING A LAUNDRY SITE**

a. Medical, dental, and chow hall personnel may require to have their laundry washed separately and on a daily basis. If needed medical personnel should provide special detergent for sterilization purposes.

REFERENCES

TM 01243E-14/1
TM 08444A-15/1

LAUNDRY INVENTORY DA 1974					
ORGANIZATION:				DATE:	
NAME:		RANK:		SSN:	

COMPONENT:

QTY	ARTICLE	QTY	ARTICLE	QTY	ARTICLE
	BAG DUFFEL		SOCKS, BLK PR.		SCARF WOOL GRN
	BAG,LAUNDRY (WHITE)		SOCKS, GRN PR.		WASH CLOTH
	BAG,LAUNDRY (GREEN)		TROUSERS,CAMOFLAGE		TOWEL BATH
	BELT,TROUSER,WEB		SERVICE SWEATER WOOL GRN		PT SHORTS
	CAP,UTILITY		UNDERSHIRT COTTON GRN		SWEAT TOPS
	COAT,CAMOFLAGE		UNDERSHIRT COTTON WHITE		SWEAT BOTTOMS
	DRAWERS,WHITE PR.				

GARRISON ARTICLES

	BLANK WOOL GRN		PILLOW CASE		MATTRESS COVER
	SHEET BED COTTON				

CIVILIAN ATTIRE

	SHIRT		TROUSERS		SOCKS
	COAT				

782 GEAR

	HELMET COVER		FLAK JACKET COVER		FIELD JACKET
	FIELD JACKET LINER		SLEEPING BAG		

TOTAL # OF PIECES
SIGNATURE OF LAUNDRY CHECKER
SIGNATURE OF CHECKER

1. Characteristics and Capabilities:

a. The Bare Base Laundry Facility is a skid mounted, self contained, mobile transportable unit capable of laundering all washable fabrics worn by Marines in the field.

b. External power to operate the facility is provided by a separate power source capable of delivering 208 VAC 3 phase 60 cycle power. External water and fuel sources are also needed.

c. In full operation properly attended, one unit is capable of processing approximately 436 people or 2,400 lbs. of laundry per day. Based on 20 hours of operation and 5.5 lbs. of laundry per man.

2. Description of Components:

a. Electrical Panel - The facility operates on 60 cycle, 3 phase, 208 VAC power. An electrical panel provides power distribution from a separate generator to the components of the laundry facility. The panel includes the necessary circuit breakers and receptacles for the water heater, water pump, and connecting plugs used to power the facility components. An electrical (halon) fire extinguisher is also mounted on the panel.

b. Washer - A heavy duty washer is powered by an externally mounted motor, drive train and control unit. The washer is controlled either automatically or manually and has a 60 pound capacity. Two 60 pound loads can be washed per hour in the automatic mode. Automatic operation is provided by a programmable control card to regulate all functions of the laundry cycle. These functions are the number of washes and rinses, water level, and water temperature. Automatic dispensing of supplies are also provided. Cards to operate the controller are pre-punched with standard cycles. Manual operation has a variable wash time of up to 30 minutes, however; should include three consecutive wash cycles of at least 5 minutes each followed by 3 consecutive rinse cycles of 2 minutes each.

c. Extractor - The extractor uses centrifugal force to extract water prior to the drying process. It is powered by a 3 HP motor coupled through a fluid drive. The extractor control has a ten minute variable timer. The extractor load capacity is 20 pounds, 20 loads an hour can be extracted at an optimum of 3 minutes per load.

d. Dryer - A heavy duty dryer is powered by an externally mounted motor and drive train. The dryer has a capacity of 30 pounds, 120 pounds per hour. Controls provide for an adjustable range of 15 minutes for the drying cycle. Air is heated by a fuel fired air heater mounted on the dryer.

e. Air Compressor - The air compressor provides air pressure for the operation of the washer water intake and drain valves. The adjustable range of compressed air is 20 to 40 pounds per square inch (psi).

f. Water Pump - A portable, centrifugal type water pump is mounted in a carrying frame. The pump is mounted on the right platform for transportation and storage. During use, it is placed near the water source

and connected to the facility by a water discharge hose and power cable. After the initial prime, the pump will deliver 18 to 20 gallons of water per minute.

g. Clothes Bin - The clothes bin is a metal container mounted on casters (metal wheels) which moves the laundry from the washer to the extractor. It includes a drain to dispose of excess water.

h. Water Heater - The M-80 hot water heater is a self-contained fuel-fired water heater that can be used to provide heated water to the washer. It is located away from the facility near the fuel source and water pump during use. During shipping the M-80 water heater is stored on the left platform.

3. Set-up Procedures:

a. Site selection

(1) The site should be located on firm, flat, level, well drained ground that will support the laundry facility and vehicles in any weather.

(2) Adequate space must be available for tentage, vehicle parking, and laundry operations.

(3) The laundry site must be located near a plentiful supply of clean water since about 500 gallons of water an hour is required for each laundry facility.

(4) A site should be selected which provides natural protection from attack and provides maximum concealment from observation.

b. Installation

(1) Position the left platform in the location selected.

(2) Place the right platform in tandem with a 6 1/4 inch gap between the two platforms.

(3) Ensure that the entire unit is level. The unit can be leveled by using sand bags or scrap lumber.

(4) Install the two joining panels between the left and right platforms.

(5) Obtain the eight ground rods/wires. Drive the ground rod assemblies into the soil near the corner of each platform. Connect the end of the ground wire to the platform ground lugs.

(6) Remove and position the M80 water heater between the left platform and where the water supply pump will be positioned.

(7) Remove, position and install the water supply pump.

(8) Remove the pump and locate it not more than ten feet from a water source.

(9) Install 1-1/2″ suction hose to the water supply pump suction port.

(10) Install the strainer to the end of the suction hose.

(11) Place the suction hose and strainer in the water source.

(12) Install the 1-1/2″ water heater hose to the water supply pump discharge port and connect the other end to the M80 water heater inlet.

(13) Obtain a 1″ hose. Connect one end to the cold water discharge valve and connect the other end to the washer cold water inlet valve (right side).

(14) Connect the power cable from the water pump to the upper left receptacle of the electrical panel.

(15) Obtain two fuel lines.

(16) On the water heater, connect one fuel line to the fuel filter inlet, and one to the fuel pump return outlet.

(17) Connect both fuel lines to the fuel source.

(18) Obtain the remaining 1″ hose. Connect one end to the water heater outlet and connect the other end to the washer hot water inlet valve, (left side).

(19) Install the power cable from the water heater to the upper right receptacle of the electrical control panel.

(20) Connect one section of the 2-1/2″ washer discharge hose and connect it to the washer drain outlet.

(21) Obtain the wye connection and connect it to the other end of the 2-1/2″ washer discharge hose.

(22) Connect the remaining 2-1/2″ washer discharge hose to the wye connection. Route the hose to a drain field.

(23) Remove the protective cover from the front of the washer control panel and place it in the storage bin.

(24) Unclip the electrical power cables on both platforms and ensuring they are not crossed and lock them together.

(25) Connect the 1-1/2″ extractor discharge hose and connect it to the extractor drain outlet.

(26) Connect the other end of the extractor discharge hose to the wye connection.

(27) Unbolt the clothes bin from the right platform.

(28) Connect the 1″ drain hose to the bottom of the clothes bin.

(29) Connect the other end of the clothes bin drain hose to the wye connector.

(30) Obtain the two remaining fuel lines.

(31) Connect one fuel line to the fuel filter inlet and one fuel line to the fuel pump return outlet.

(32) Connect the fuel lines to the fuel source.

(33) Connect the dryer five inch exhaust duct to the dryer exhaust port. Extend the duct away from the dryer. Support the duct with the ground.

(34) Connect the twelve inch canvas duct and install it on the dryer unit duct port. Extend the duct to its full length.

(35) Reassemble the storage bin and latch all eight latches.

b. Pre-position of Valves and Switches

(1) Control Panel - Ensure that all switches in control panel are in the “OFF” position.

(2) Raw Water Pump

(a) Close the cold water discharge valve.

(b) Ensure raw water pump switch is in the “OFF” position.

(c) Close the petcock on the bottom of the pump housing

(3) M-80 Water Heater

(a) Fully open air dampner

(b) Ensure that the fuel shut off valve is “CLOSED”.

(c) Set the temperature controls at 160 degrees.

(d) Open the air bleed valve on the top of the water heater.

(e) Close the water heater discharge valve.

(f) Ensure power switch is in the “OFF” position.

(4) Compressor - Close petcock on air compressor tank.

(5) Washer - Ensure all switches are in “AUTO”, “OFF”, or “STOP” position.

(6) Extractor

(a) Set the timer to zero.

(b) Ensure “EMERGENCY STOP” button is in “OFF” position.

(7) Dryer

(a) Close fuel bleed petcock.

(b) Close fuel shut off valve.

(c) Ensure power switch is in the “STOP” position.

(d) Set dryer temperature control: Cotton-130 degrees, Wool-200 degrees.

c. Conduct Before Operation Checks and Services

(1) Visual Inspection

(a) Check for any missing or loose nuts, bolts, and screws.

(b) Inspect unit for damage.

(c) Check gauges and controls.

(d) Check switches and valves.

(2) Lubricants

(a) Grease, Automotive and Artillery - MIL-G 10924C (GAA).

(b) Lubricating Oil, Non-Detergent, OE-30 - MIL-L-2104.

(c) Lubricating Oil, Bear, Multipurpose, GO-80/90 - MIO-L-2105C.

(3) Lubrication Points - All lubrication points are checked/filled daily and weekly. They are changed quarterly.

(a) Washer Drive Motor - Lubricate the two (2) lubrication fittings located on the top of the washer drive motor with GAA grease.

(b) Washer Gear Reduction Unit - Fill the gear box through the filler hole with OE-30 oil until it begins to run out of the level hole.

(c) Extractor

1 Lubricate the brake arm and brake shoe pivot points at the three lubrication fittings with GAA grease.

2 Lubricate the lid hinge with OE 30.

3 Coat the surface of the gyro ball with GAA grease.

4 Lubricate the extractor motor at the lubrication fitting located at the top of the motor with GAA grease.

CAUTION: DO NOT GET GREASE ON THE BRAKE SHOE OR BRAKING SURFACES!

(d) Dryer inner and outer shaft bearing.

1 To lubricate, turn the caps down (1) one full turn.

2 If the caps can not be turned down (1) full turn, remove the caps and refill with GAA.

3 Reinstall the caps (1) one full turn.

(e) Dryer Drive Chain and Sprocket. Lift the cap on the drive chain oil cup and fill with OE-30 oil.

(f) Dryer Gear Reduction Unit

1 Fill the gear box through the filler plug hole with GO 80/90 oil until it begins to run back out of the hole.

2 Apply grease to the lubrication fitting on the center front of the unit.

4. Starting Procedures:

a. Turn on external power source.

b. On the laundry facility, turn on the main breaker in the electrical control panel, breaker #10.

c. Air Compressor:

(1) In the electrical control panel, turn on the breaker to the air compressor, breaker #7, and check the rotation of the compressor motor. If the motor does not rotate in the direction of the arrow on the housing (clockwise), shut off the main power source and reverse any two source phases at the power source.

(2) When the air compressor pressure gauge reaches 20 psi., open the air drain cock on the air tank to bleed all condensation from the system.

(3) Close the air drain cock. When the pressure gauge reaches 40 psi. The air compressor will shut off. The air pressure gauge must always read from 20-40 psi, during operation.

(4) Listen for air leaks near the control panel, intake valves, and the air compressor.

d. Turn on all remaining breakers in the electrical control panel.

e. Water Pump:

(1) On the water pump, turn on the power switch and verify proper rotation (clockwise) according to the arrow on the pump motor.

(2) Open the pump cold water discharge valve.

f. M-80 water heater.

(1) Wait for a steady stream of water to exit from the air bleed valve, then close the valve.

(2) On the water heater, press the reset button.

(3) Then jog the power switch to verify proper rotation of the blower motor (clockwise).

(4) While the blower motor is energized, quickly check for spark at the electrodes by looking through the sight glass located at the center of the burner assembly.

(5) Wait for a "click" to be heard from the fuel solenoid. This indicates that the fuel solenoid is now open. Verify that the fuel pressure gauge rises to 100 psi. and immediately open the fuel shut off valve at least ¼ to ¾ turn. The burner should ignite within a few seconds, indicated by a bright, clean flame when looking through the burner sight glass.

(6) When the water temperature reaches 160 degrees, the M80 water heater will shut off automatically and the fuel pressure gauge will register zero.

(7) Open the water heater discharge valve.

g. Washer:

(1) Control Panel and Switches.

(a) Auto/Manual

1 Enables Program Timer switches in the "Auto position.

2 Enables the Door Unlock switch in the "Off" position.

3 Enables the control switches in the "manual" position.

(b) Manual Water Level - Controls "HIGH" or "LOW" water level determined by the weight of the load. **HIGH** is for 11 inches of water. **LOW** is for 8 inches of water.

(c) Supply 1 - In the manual position, enables the control solenoid for water flow into supply cup #1.

(d) Supply 2 - In the manual position, enables the control solenoid for water flow into supply cup #2.

(e) Supply 3 - In the manual position, enables the control solenoid for water flow into supply cup #3.

(f) Supply 4 - In the manual position, enables the control solenoid for water flow into supply cup #4.

(g) Hot Water - In the manual position, enables the control solenoid for air supply to the hot water inlet valve.

(h) Cold Water - In the manual position, enables the control solenoid for air supply to the cold water inlet valve.

(i) Drain - In the manual position, enables the control solenoid for activation of the air drain valve.

(j) Cool Down - When placed in the manual position, cold water is injected into the wash to accelerate the cool down cycle.

(k) Run/Stop - When this knob is placed in the "RUN" position, a one RPM drive motor is turned on which starts the movement of the program card. This switch is only used in the automatic mode of wash.

(2) Program Card Tracks

(a) Track 1 - Activates and controls the water injection valve for supply cup #1.

(b) Track 2 - Activates and controls the water injection valve for supply cup #2.

(c) Track 3 - Provides power to the master relay unit coil through the Auto/Manual switch. When the track is cut, it turns the machine "OFF" after completion of the wash cycle.

(d) Track 4 - Activates the solenoid which controls air to the cold water valve.

(e) Track 5 - Activates the solenoid which controls air to the hot water valve.

(f) Track 6 - Activates and controls the water injection valve for supply cup #3.

(g) Track 7 - Activates the cold water level inlet valve for automatic cool down.

(h) Track 8 - Activates and controls the water injection valve for supply cup #4.

(i) Track 9 - When the chart is cut, power is transferred from one water level to the other. When the chart is cut the "High Level" position is connected. If no cut is made, the "Low Level" position is connected.

(j) Track 10 - Unused

(k) Track 11 - Activate the solenoid which controls air to the drain valve when the chart is cut.

(l) Track 12 – Unused

(3) Manual Washing - The following steps are for operating the washer manually.

(a) Load the supply cups with washing supplies.

1 6 oz, 3 oz, and 2 oz. of suds

2 2 oz. of sour

(b) Load the washer with no more than 60 pounds of laundry.

(c) Place the MANUAL WATER LEVEL switch in the "HIGH" or "LOW" position as determined by the weight of the load.

(d) Place the AUTO/MANUAL switch in the "MANUAL" position.

(e) Place the DRAIN switch in the "MANUAL" position, this closes the drain.

(f) For **HOT WATER WASH**, place the HOT WATER switch in the "MANUAL" position and leave the COLD WATER switch in the "AUTO" position.

(g) For **COLD WATER WASH**, place the COLD WATER switch in the "MANUAL" position and leave the HOT WATER switch in the "AUTO" position.

(h) For **WARM WATER WASH**, place both the HOT and COLD WATER switches in the "MANUAL" position.

(i) To **DRAIN**, place the DRAIN, HOT and COLD WATER switches in the "AUTO" position. Place water level switch to “off”.

(j) To **RINSE**, place the drain switch to manual and the water level switch to high. Select either hot, cold or warm water to rinse laundry. All supply switches remain in the "AUTO" position for the rinse cycle.

NOTE: The washer will fill to the pre-selected water level and begin the wash cycle in the automatic mode. The wash cycle will continue indefinitely until the AUTO/MANUAL switch is placed in the "OFF" position in the manual mode. Clothing can be damaged by supplies added at the wrong time during the wash cycle.

(k) Add the washing supplies at the proper time during the wash cycle by placing the proper SUPPLY switch in the "MANUAL" position. Return the switch to "AUTO" when the supply is added and allow the load to wash for the time designated on the formula.

COTTON WASH FORMULA FOR MANUAL OPERATION				
OPERATION	WATER LEVEL	FILLING AND DRAINING	TIME INCLUDES TEMPERATURE	WATER DETERGENT
Suds	8 Inches	5 Min	100 Degrees	6 oz
Suds	8 Inches	5 Min	130 Degrees or higher	3 oz
Suds	8 Inches	5 Min	130 Degrees or higher	2 oz
Rinse	11 Inches	2 Min	130 Degrees or higher	
Rinse	11 Inches	2 Min	130 Degrees or higher	
Rinse	11 Inches	2 Min	130 Degrees or higher	

WOOL WASH FORMULA FOR MANUAL OPERATION				
OPERATION	WATER LEVEL	FILLING AND DRAINING	TIME INCLUDES TEMPERATURE	WATER DETERGENT
Suds	11 Inches	5 Min	100 Degrees	6 oz
Suds	11 Inches	5 Min	100 Degrees	3 oz
Suds	11 Inches	5 Min	100 Degrees	2 oz
Rinse	11 Inches	2 Min	100 Degrees	
Rinse	11 Inches	2 Min	100 Degrees	
Rinse	11 Inches	2 Min	100 Degrees	

NOTE: Water levels are average with a fully loaded washer at rest. Filling and draining will be accomplished with washer at rest. Allow for absorption before first suds.

(l) To **COOL DOWN** the clothing, place the Cool Down switch in the "MANUAL" position, return the switch to the "AUTO" position after cool down is complete. Cool down is monitored on the washer temperature gauge.

(m) To end the manual cycle, place all switches in the "AUTO" position except the AUTO/MANUAL switch and the MANUAL WATER LEVEL switch, which are placed in the "OFF" position.

(n) When the water has drained sufficiently to safely open the door, push and hold the DOOR UNLOCK switch and unlatch the door.

(o) Transfer the laundry to the clothes bin for water extraction.

(p) Empty the supply cups to remove any residue.

(4) Automatic Washing - The program timer control is designed to provide for automatic or manual control of the wash cycle functions. In the automatic mode, the various functions of the wash cycle are controlled by twelve switches that respond to cut outs in the program card. In addition, switches on the control panel can be used to override the automatic function, thus providing a wide flexibility of wash. The chart provided contains a complete description of the program timer card functions. The following steps are for operating the washer using the automatic timer.

NOTE: Washing supplies must be added to the supply cups prior to the start of the automatic cycle and according to the program card. No audible or visual alarm is given when supplies are needed.

(a) Load the supply cups with supplies.

(b) Load the washer with up to 60 pounds of laundry.

(c) Ensure the MANUAL WATER LEVEL and AUTO/MANUAL switches are in the "OFF" position.

(d) Ensure the RUN/STOP knob is in the "STOP" position.

(e) Place all other switches in the "AUTO" position.

(f) In a downward motion, insert the pre punched formula chart into the program timer slot until it engages the feed sprockets.

(g) Turn the thumb wheel until the chart reaches the start position.

(h) Place the AUTO/MANUAL switch in the "AUTO" position.

(i) Turn the RUN/STOP knob to the "RUN" position. The basket will start turning, the washer will fill to the proper water level, washing will be started, and supplies automatically injected at the appropriate time.

(j) At the end of the wash cycle the drain valve will open, draining the water from the washer.

(k) Return the RUN/STOP knob to the "STOP" position.

(l) Place the AUTO/MANUAL switch to the "OFF" position.

(m) Remove the pre punched formula chart in a downward motion.

(n) To open the washer door at completion of the cycle, push and hold the DOOR UNLOCK switch and unlatch the door.

(o) Transfer the laundry to the clothes bin for water extraction.

(p) Empty the supply cups to remove any residue.

h. Extractor

(1) Transfer 20 pounds of laundry from the clothes bin to the extractor.

(2) Distribute the load evenly around the basket for balance. Ensure all articles are completely inside the basket.

(3) Close the extractor lid.

(4) Set the timer to the desired setting, normally three minutes.

(5) Pull out the EMERGENCY STOP button.

(6) Press the START button.

(7) The lid will lock, the red signal light comes on, and the extractor will operate for the set time.

(8) When extraction is completed, the basket will stop and the signal light will go out.

(9) After the signal light goes out, push the EMERGENCY STOP button.

WARNING: WHILE THE EXTRACTOR BASKET IS SPINNING, KEEP HANDS AWAY. DO NOT ATTEMPT TO FORCE OPEN THE EXTRACTOR LID OR ADJUST THE TIMER WHILE THE EXTRACTOR IS IN OPERATION OR TIMER DAMAGE WILL RESULT.

(10) Open the lid and transfer the load to the dryer

(11) Repeat steps (1) through (11) for the remainder of the washer load.

(12) Emergency stop procedures.

(a) If the machine vibrates excessively, is extremely noisy or something is caught between the basket and curb, push the EMERGENCY STOP button.

(b) When the signal light goes out, open the lid and rebalance the load. Ensure nothing has dropped between the basket and the curb.

(c) To restart the extractor, pull out the EMERGENCY STOP button, close the lid, and press the START button.

i. Dryer

(1) Remove the load from the extractor and place not more than 30 pounds in the dryer.

(2) Close the tumbler door securely.

(3) Set the drying time (approximately 10 - 15 minutes).

(4) Verify the setting on the temperature control.

(a) For cotton, maximum of 200 degrees Fahrenheit.

(b) For wool, maximum of 130 degrees Fahrenheit.

(5) Jog the start button on the dryer control panel and check rotation of the motor (counterclockwise) and then press the start button.

(6) Check the fuel pressure gauge for a reading between 115 and 125 psi. (**DO NOT LOOK FOR A SPARK BECAUSE YOU WILL NOT SEE ONE**). If fuel pressure cannot be achieved, open the fuel bleed petcock to bleed all air from the system. When no more air escapes close the petcock and recheck the pressure gauge.

(7) Once it is turned on wait for a "click" to be heard from the fuel solenoid, this indicates that the solenoid is now open.

(8) Once the proper fuel pressure is obtained, and the solenoid clicks, immediately open the fuel shut off valve at least one full turn.

(9) Make sure the dryer burner is lit by observing a bright, clean flame through the sight glass. If the dryer does not light, close the fuel shut off valve and repeat steps (5) through (9).

(10) Observe the temperature gauge and ensure that it reaches the proper setting.

(11) When the buzzer sounds, turn the timer off, open the dryer door, and check the laundry for dryness.

(12) If the laundry is dry remove it, if the laundry is not dry, repeat step (4) using a three minute drying cycle until the laundry is dry.

NOTE: The dryer burner is equipped with an ultra violet (UV) scanner and a flame safeguard control unit to purge any fumes or vapors from the combustion chamber prior to operation. The control unit will also cause a safety shutdown if the burner does not ignite within a preset time.

(13) If the flame safeguard light on the front of the dryer near the ON/OFF switches lights up perform the following:

(a) Shut down the unit and remove the six screws from the dryer access panel.

(b) Remove the access panel.

(c) Push in and hold the red reset button on the flame safeguard for two minutes.

(d) Release the reset button, restart the dryer, and the dryer should continue normal operation.

(e) Replace the access cover and secure with the six screws.

5. <u>During operation checks and services</u>:

a. Monitor all gauges for their correct readings.

(1) The air compressor gauge must read between 20 and 40 psi.

(2) Ensure that the proper water temperature is being used when washing clothing.

(3) Verify that the dryer is operating at the proper temperature for the type of clothing being dried.

(a) 200 degrees maximum temperature for cotton items.

(b) 130 degrees maximum temperature for wool items.

(4) Fuel pressure on the dryer should read between 115 and 125 psi.

(5) Inspect the unit for any type of water, air, or fuel leaks.

(6) Listen for any unusual noises.

6. Shutdown Procedures:

NOTE: The unit may begin to be shutdown while the last load of wash is being dried.

a. M-80 Water Heater

(1) On the water heater, close the fuel shutoff valve.

(2) Turn off the power switch.

(3) Return to the washer control panel.

(4) Place the AUTO/MANUAL switch in the "MANUAL" position.

(5) Place the MANUAL WATER LEVEL switch in the "HIGH" position.

(6) Ensure that the washer drain is open.

(7) Place the HOT WATER switch in the "MANUAL" position.

(8) Monitor the temperature gauge on the hot water heater until the temperature drops below 100^{o}.

b. Washer - Once the temperature on the hot water heater has dropped below a 100 degrees, place all the switches on the control panel in the OFF/AUTO position and leave the drain OPEN. Ensure all switches on the washer control panel are in the "AUTO", "OFF" or "STOP" position.

c. Water Pump

(1) Turn off the power switch.

(2) Close the cold water discharge valve.

d. Air Compressor

(1) In the electrical control panel, turn off breaker #7, this cuts the power to the compressor.

(2) Open the air drain cock on the air tank, allowing all air to escape and leave open.

e. Extractor - Ensure the TIMER is set on "0" and the EMERGENCY STOP button is pushed in.

f. Dryer Tumbler

(1) Close the fuel shut off valve.

(2) With the dryer door open, allow the dryer to run until the temperature gauge drops to 100 or below.

(3) Close the dryer door and allow all exhaust to exit the burner until the exhaust coming out of the duct becomes clear.

(4) Shut the dryer off by pushing the red STOP/RESET button.

(5) Set the timer to off.

g. Electrical Control Panel - Place all remaining breakers in the "OFF" position.

7. After Operation Checks and Services:

a. Perform a Visual Inspection on the laundry facility, checking for any damage that may have occurred during operation.

b. Recheck all lubrication points and lubricate as required.

8. Disassembly and Storage:

a. Drain the unit.

b. Disconnect the power cables and hoses.

WARNING: ALL CIRCUIT BREAKERS ON THE ELECTRICAL CONTROL PANEL MUST BE OFF PRIOR TO DISCONNECTING POWER CABLES.

c. Inspect – 360 visual inspection of equipment.

d. Inventory all components.

e. Clean the unit and spot paint.