Installation Manual

Model NMSB V
Power Operated Unit

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Warranty

Supplier warrants each item of equipment in the Nasatka Maximum Security Barrier for a period of 1 year, after delivery F.O.B. plant, unless otherwise specified by Supplier, from failure of operation in ordinary use and against defects due to faulty material or workmanship. Any defective equipment in the Nasatka Maximum Security Barrier shall be returned to the factory, at Supplier's option, for repair or replacement, and Supplier assumes no responsibility for service at any consumer site. Supplier is in no event responsible for any labor costs under the warranty. Subject to the above limitation, all service, parts, and replacements necessary to maintain the equipment as warranted shall be furnished by Supplier at no cost to consumer. Supplier shall not have any liability under these specifications, other than for repair or replacement as described above for equipment malfunction or equipment failure of any kind, caused for any reason, including, but not limited to unauthorized repairs, improper installation, installation not performed by Supplier personnel, nor by Supplier authorized personnel, modifications, misuse, accident, catastrophe, neglect, natural disaster, act of God of if at any time the power supplied to any part of the Nasatka Maximum Security Barrier falls short or exceeds the rate of tolerance for the equipment.

The exclusive remedy for breach of any warranty by Supplier shall be the repair or replacement at supplier's option, of any defects in the equipment. IN NO EVENT SHALL THE SUPPLIER OF NASATKA MAXIMUM SECURITY BARRIER BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES OR ANY KIND OF DAMAGES TO ANYONE. Except as provided herein, Supplier makes no warranties or representations to consumer or to anyone else and consumer hereby waives all liability against Supplier as well as any other person for the design, manufacture, sale, installation, and/or servicing of the Nasatka Maximum Security Barrier.

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Any modification or alteration by anyone other than NASATKA or NASATKA authorized personnel will render the NASATKA warranty herein as null and void.

DISCLAIMER:
All barriers systems, should be carefully planned with safety as a paramount concern. The product is designed to control vehicle traffic. Nasatka Barrier is not a traffic safety-engineering firm and recommends that a system be review before installation. It is recommend that all forms of safety be used where possible, example are proper lighting, written warnings sign, traffic lights, gate arm and audible.

INTRODUCTION

The Nasatka Maximum Security Vehicle Arrest Barrier plays a leading role in the vehicle access control industry. The patented surface mount design greatly simplifies barrier installation and eliminates *all* major site excavation. By utilizing the latest technology in the design of the proprietary hydraulic power unit and the microprocessor based electronic control system, the NMSB provides performance, reliability, safety and security unmatched in the industry.

Having been designed, manufactured, and approved to exceed 15,000-pound truck traveling at 50 mph, Nasatka will provide videocassette tapes to qualified parties who wish to witness the basic installation procedure and the stopping power of these devices.

Operating security has been maximized by eliminating the decisions required by the system attendant to the level that Nasatka can provide a totally automatic system, which requires no personnel to control vehicle access.

Each system is 100% factory tested and adjusted for normal installed operating conditions. The Barrier, Hydraulic Power Unit and the Electronic Control are interconnected and run in all operating modes. This insures that each component part of the NMSB is functioning in accordance with the customer operating parameters and the quality assurance standards of Nasatka Barrier, Inc.

Nasatka's pre-procurement "check list" insures the proper system configuration and operation with the minimum expenditure of time and at the lowest possible cost.

In addition, our standard system documentation contains over 30 pages of detailed, step-by-step, information pertaining to all aspects of installation, start up, trouble shooting, and maintenance. Familiarity with vehicle access systems, hydraulics or electronics is not required to properly install, operate, and maintain the NMSB!

SPECIFICATIONS

MODEL: NMSB V

CRASH TESTED: 15,000 lbs at 50 mph,

WEIGHT - 3,800 lbs.

SIZE - Length - 108", Width - 60" (for standard 9' barrier)
Height - 34"

VOLTAGE - The NMSB is supplied to operate from standard 1 phase
line voltage between 120/208-230 volts. Controls will operate on 24vdc 1 phase

FREQUENCY - 50 HZ, 3 HP Motor

FULL LOAD CURRENT - The full load current depends on the actual line voltage and frequency that the barrier is operated from. The following are two examples:

- 5.6 AMP @ 220 V, 60 HZ
- 2.9 AMP @ 415 V, 60 HZ

OPERATOR CONTROLS - E-up, Close and Open push buttons.

HYDRAULIC FLUID -
Capacity - 10 gallon nominal.
Type -U.S.P.P petroleum base.
Recommended Brand - Transmission Fluid.

CYCLE TIME - Nominal 2 cycle (raise or lower) time is about 3 seconds
for normal operation and 1.5 seconds for E-up operation.

HYDRAULIC PRESSURE - (factory setting)
Pump Output - 2000-PSI relief valve setting
Barrier Requirements - 1700 PSI

OPERATING TEMPERATURE - -10E to 120E Fahrenheit with added heat.

STANDARD OPERATING SYSTEM

The following are the statements of operation for the standard NMSB barrier. If the functional requirements of the installation are different from the standard, Nasatka must be notified at the time of order and any additional cost for the required changes will be quoted as an addition to the standard price.

The four (4) operating possibilities are:

(1) The barrier is fully open (down).

(2) The barrier is fully closed (secure).

(3) The barrier is between fully open and fully closed and moving toward the closed position.

(4) The barrier is between fully open and fully closed and moving toward the open position.

Results of all possible operator inputs, i.e., Emergency Close, Close, and Open, for the four (4) standard operating modes are described on the following pages.

Standard operating condition

(1) Barrier is fully open (down):

Operator input -	Result -
A. Emergency Close	Barrier goes to secure position in approx. one (1) second. An alarm sounds continuously, until manual (key) reset of the system.
B. Close	Barrier goes to the fully secure position in standard operating time.
C. Open	No action.

(2) Barrier is fully closed (secure):

Operator input -	Result -
A. Emergency close	Alarm sounds continuously, until manual (key) reset of the system.
B. Close	No action.

C. Open	Barrier goes to the fully open position in standard operating time.

(3) Barrier is between open and closed and moving toward secure position:

Operator input -	Result -
A. Emergency close	Barrier goes to secure position in approx. one (1) second. An alarm sounds continuously, until manual (key) reset of the system.
B. Close	Barrier continues toward the fully secure position in standard operating time.
C. Open	Barrier immediately reverses direction of travel and goes to the fully open position in standard operating time (slightly faster due to reduce travel).

(4) Barrier is between open and closed and moving toward open position:

Operator input -	Result -
A. Emergency close	Barrier immediately reverses direction of travel and goes to the secure position in approx. one (1) second. An alarm sounds continuously, until manual (key) reset of the system.
B. Close	Barrier immediately reverses direction of travel and goes to the fully secure position in standard operating time (slightly faster due to reduced travel).
C. Open	Barrier continues toward the fully open position in standard operating time.

Mechanical Installation

Special Tools Required:

1) 4,000 lb capacity forklift (or other suitable device).
2) Electrical test meter.

Standard Materials Required:

1) 6" x 6" Number Four Reinforced Woven Wire Mesh.
2) Approximately four cubic yards of 3,000-PSI Concrete.
3) Sufficient 3/4" PVC pipe for conduit at barrier.
4) Sufficient shielded wire for electrical interconnections (multi-conductor cable may be used).
5) Sufficient wire, of the proper gauge to meet local electrical codes, to power the system.
8) Fused electrical disconnects for the control panel.
9) U.S.P. Petroleum base for Hydraulics, Transmission Fluid is recommended

BARRIER FOUNDATION

Refer to drawing 3157, 3157-1, and 3157-2 for exact dimensions.

A. Excavate area where barrier is to be installed. Area is to be 8' wide by 11' long (NOTE: the length of the foundation may vary, depending on the length of the barrier) by 5'deep. After excavating, tamp base firmly. If a drain for the system is recommended install a 6' drain in the center of the foundation. Refer to drawing 3157-2 for drain location.

B. Install a 8" base slab with one layer of wire mesh in excavates area for barrier foundation. Let foundation set for 24 hours before placement of barrier.

C. Place barrier into foundation. Set the barrier to road surface grade (use a sting line across the top of the sub-frame). Shim where necessary under each side.

D. Install a 3/4" conduit for the control feed. (NOTE: there is a slot placed on the side of the barrier for conduit hook-up.)

D. Install a 3" conduit for the hydraulic unit , and install a 3/4" conduit for the control feed. (NOTE: there is a slot placed on the side of the barrier for hydraulic hook-up.)

E. Install wire mesh around barrier foundation,(drawing 3157-2). Begin to pour concrete into foundation, making sure that the pad is level. (NOTE: If you make the pad sloop at both the front and back, water will not be able to build up around the barrier.) Let concrete set for 48 hours before operation barrier.

. **Electrical Installation**

The electrical installation consists of two phases:

1) Connection of inputs/outputs.
2) Power connections.

It is highly recommended that a qualified electrician assist or complete the following connections to protect sensitive electronic components.

All electrical field connections should be made in accordance with NEMA and local code.

It is also recommended to use either color coding or numbering for all electrical connections to assist in identifying the proper wires at each end. You may also substitute multi-conductor cable for single strand wire to facilitate the interconnection procedure. When connecting inputs/outputs use shielded cable when doing these connections. DO NOT combine signals of different voltage in the same multi-wire cable or conduit.

Should your system configuration include any optional features, locate the additional instruction sheets at the end of the sections and insert them in the appropriate part of the manual to reduce the time required to complete the connections.

NOTE: Make sure the barrier is in the up (close) position while making ALL the following connections. Refer to drawings 7002-5A,

Connection of Inputs/Outputs

1) Connection of the inputs /outputs from the master panel to the control panel, located on the hydraulic unit.

NOTE: Use 18 AWG wire for the following connections.

A) Prepare a ten (10) wire interconnect cable of the proper length for your installation from the master panel to the hydraulic unit and make the following connections.

B) Connect the first wire between terminal 1 at the master panel to terminal 1 (Common) in the control panel.

C) Connect the second wire between terminal 2 at the master panel to terminal 2 (E-up button) in the control panel.

D) Connect the third wire between terminal 3 at the master panel to terminal 3 (Reset key) in the control panel.

E) Connect the fourth wire between terminal 4 at the master panel to terminal 4 (Up button) in the control panel.

F) Connect the fifth wire between terminal 5 at the master panel to terminal 5 (Down button) in the control panel.

G) Connect the sixth wire between terminal 8 at the master panel to terminal 8 (Output common) in the control panel.

H) Connect the seventh wire between terminal 9 at the master panel to terminal 9 (E-light) in the control panel.

I) Connect the eighth wire between terminal 10 at the master panel to terminal 10 (Close light) in the control panel.

J) Connect the ninth wire between terminal 11 at the master panel to terminal 11 (Open light) in the control panel.

K) Connect the tenth wire between terminal 19 at the master panel to terminal 19 (Enunciator) in the control panel.

2) Connection of the down limit switch from the barrier to the control panel.

A) Limit switches are pre-wired, the following connections are made.

B) Connect the common terminal from the down limit switch to terminal 18 (Common Limit) in the control panel.

E) Connect the NO (Normally Open) terminal from Down limit switch to terminal 20 (Down Limit) in the control panel.

3) Connection of solenoids from the hydraulic unit to the control panel.

A) Solenoids are pre-wired at the factory, the following connections are made.

B) Connect the common from the solenoids to terminal 21 (Common solenoid) in the control panel.

C) Connect the E-up wire to terminal 22 (E-up solenoid) in the control panel. The E-Up solenoid is located between the accumulator and motor of the barrier.

D) Connect the Up wire to terminal 23 (Up solenoid) in the control panel. The up solenoid is located on hydraulic unit facing the unit, to the right side of the solenoid.

E) Connect the Down wire to terminal 24 (Down solenoid) in the control panel. The Down solenoid is located on the hydraulic unit facing the unit, to the left side of the solenoid.

4) Connection of safety detector from the roadway to the control panel.

NOTE: Use 18 AWG wire for the following connections.

A) Prepare a two (2) wire interconnect cable of the proper length from the safety detector to the control panel for your installation and make the following connections.

B) Connect the common wire from each safety detector to terminal 18 (Common Limit) in the control panel.

C) Connect the second wire from the N/O (normal open) from each safety detector to terminal 19 (Safety) in the control panel.

NOTE: The safety detector is used to prevent the barrier from raising when a vehicle is present. Any safety device can be used with this system as long as there is a dry N/O

contact is used, when a object is present the contact closes and remain close until the object is removed.

5) Connection of traffic lights from the barrier to the control panel.

NOTE: Use 16 AWG wire for the following connections.

A) Prepare a three (3) wire interconnect cable of the proper length from the traffic lights to the control panel for your installation and make the following connections.

B) Connect the common wire from each traffic light to terminal 13 (Common traffic light) in the control panel.

C) Connect the second wire from the red traffic light to terminal 14 (Red traffic light) in the control panel.

D) Connect the third wire from the yellow traffic light to terminal 15 (Yellow traffic light) in the control panel.

6) Connection of Pressure switch from the hydraulic unit to the control panel.

A) Prepare a two (2) wire interconnect cable of the proper length from the pressure switch to the control panel for your installation and make the following connections.

B) Connect the common wire from the pressure switch to terminal 18 (Common Limit) in the control panel.

C) Connect the second wire from the N/O (normal open) from the pressure switch to terminal 7 (Pressure switch) in the control panel.

7) Connection of Low Level switch from the hydraulic unit to the control panel.

A) Prepare a two (2) wire interconnect cable of the proper length from the low level switch to the control panel for your installation and make the following connections.

B) Connect the common wire from the low level switch to terminal 18 (Common Limit) in the control panel.

C) Connect the second wire from the N/O (normal open) from the low level switch to terminal 6 (Low Level) in the control panel.

Power Connections

Make the following power connections to the Barrier Unit:

NOTE: These connections should be made through electrical disconnects. At this time, make the wiring connections only.

DO NOT POWER THE SYSTEM

CONTROL UNIT:

A) Connect 220 volt single, (1) phase (or the proper voltage for your system) from the electrical disconnect (make sure the disconnect is open) to the terminals 16 & 17 on the control panel.

B) Connect a proper system ground to the ground lug (or terminal) inside the hydraulic unit. All internal ground connections are terminated here.

C) Note: If the hydraulic motor is powered by another power source, other then from control power. Then the power must be connected directly to the motor relay inside the control panel. (Hydraulic motor is 220-230/415 3phase 2hp)

NOTE: Consult your National Electrical Code specifications for the proper wire size necessary to complete the power connections in your area.

ALL ELECTRICAL CONNECTIONS ARE NOW COMPLETE. PLEASE DOUBLE CHECK YOUR WORK CAREFULLY AS IMPROPER CONNECTIONS CAN AND WILL DAMAGE THE SYSTEM AND VOID THE WARRANTY.

Barrier Maintenance Manual
Standard NMSB Barriers

INTRODUCTION

This manual provides descriptive information, operation and maintenance instruction for standard NMSB Barriers, as provided by Nasatka Barrier, Inc.

WARNING

It is imperative that personnel involved in the installation, service, and operation of the barrier be familiar with how the equipment is to be used, the limitations of the system and its component parts, and have knowledge of good mechanical practices in terms of safety, installation, and maintenance and when servicing the barrier that the safety bar be installed before going into the barrier.

DESCRIPTION

Mechanically, the NMSB usually consists of just the main rotating barrier section.

PREPARATION FOR USE, UNPACKING AND CHECKING

The Barrier is mounted loose and carefully loaded for shipment. **Do not remove it from the truck until it has been carefully checked for damage that may have occurred in transit.** Report all damage immediately to the carrier and send a copy to Nasatka Barrier, Inc.

STORAGE

If the Barrier is going to be installed immediately, it may be stored outdoors and covered with a plastic sheet. It should be raised off of the ground to prevent rust and corrosion. If long-term storage is expected (6 months or more), we recommend storing the components indoors and covering them with a ventilated plastic sheet to prevent condensation buildup.

HANDLING FOR INSTALLATION

Barriers should be moved with a forklift truck, with at least 4000-pound capacity. The main barrier should be moved with 2" x 4" boards underneath to distribute and steady the load.

SPECIAL TOOLS

All normal service and maintenance on standard barriers can be accomplished with standard hand tools. No special tools are required.

MAINTENANCE SUGGESTIONS

Mechanically, the Nasatka Barrier is nearly maintenance free. There are, however, several areas, which require periodic inspection and attention.

1) Check for hydraulic systems leaks at the power unit and at the cylinder on a weekly basis. Vibration can and will loosen fittings.

2) Inspect the fluid level on the side of the hydraulic power unit and maintain the proper level at all times.

3) Make sure that the hinge area of the barrier is kept clean and free from buildup of liter and dirt. No lubrication is required at the hinge in normal service.

4) Should there be extended periods of sub-freezing temperatures, do not allow ice to accumulate at the hinge area or inside of the barrier housings. Ice should be broken free and swept away from these areas. In extreme conditions, it may be necessary to install "strip heaters" in the concrete to insure there is no buildup of ice.

5) The reservoir must be filled with clean fluid through the filler cap on the reservoir. The type of fluid must be compatible with the seals used on the power unit, and must comply with the recommendations of the manufacturers' of the component parts.

6) Reservoirs - Maintain oil level at all times. The oil should be checked after the first 100 hours and verify that the class of oil meets the requirements of the pump being used. Change the oil every 1000 to 2000 hours depending on the application and operation environment.

Most importantly, it is essential that a routine program of inspection and maintenance be established to prevent damage to the system.

MAINTENANCE SUGGESTIONS

1) Set up filter maintenance schedule and follow it diligently.

2) Inspect filter elements that have been removed from system for signs of failure, which may indicate that the service interval should be shortened and of impending system problems.

3) Do not return to the system any fluid, which may have leaked out.

4) Always keep the supply of fresh fluid covered tightly.

5) Use clean containers, hoses, and funnels when filling the reservoir. Use of a filter cart when adding oil is highly recommended.

6) Use common sense precautions to prevent entry of dirt into components that have been temporarily removed from the circuit.

7) Make sure that all cleaned-out holes, filler caps, and filters on the reservoir are properly fastened.

8) Do not run the system unless all normally provided filtration devices are in place.

9) Make certain that the fluid used in the system is of a type recommended by the manufacturer of the system or components.

10) Before changing from one type of fluid to another (e.g., from petroleum base oil to a fire resistant fluid), consult component and filter manufacturers for selection of the fluid and the filters that should be used. Also consult the publication "RECOMMENDED PRACTICE FOR THE USE OF FIRE RESISTANT FLUIDS FOR FLUID POWER SYSTEMS", which is published by the National Fluid Power Association.

ELECTRICAL

Connect the pump motor to the facility power source following good practices as outlined in the National Electric Coed and any local codes, which may apply. Verify that the available voltage is the same as the voltage identified on the motor nameplate. Most motors have dual voltage ratings, so verify that the leads in the conduit box have been connected together, as defined on the motor nameplate, to match the facility power source available.

If Solenoid valves, pressure/temperature switches, or oil immersion heaters have been provided on the power unit, refer to the component name tag or other service information in this manual for operating voltage and ratings.

SUPPLY AND RETURN CONNECTIONS

Complete all necessary interconnecting piping between the power unit and hydraulic actuators. The line sizes should be determined based on oil flow, operating pressure, and allowable pressure drop between the power unit and actuator.

WARNING

Check to insure that the proper rated hose or pipe is used on pressure lines.

One of the key ingredients for good service and long life from a hydraulic system is cleanliness. And since it has been our experience that most dirt infiltrates a hydraulic system during installation, we recommend the following rules be adhered to:

A) All open ports on the power unit, cylinders, etc. must remain plugged with tape or plastic plugs until just before the hydraulic connections are made.

B) All interconnecting tubing, pipe, or hose should be clean, and free of rust, scale and dirt. The ends of all connectors should be plugged until just before they are to be installed in the system.

C) All openings in the reservoir system, such as the filler, breather, or access end cover holes, must remain closed during installation.

D) If Teflon tape, or pipe dope is used, be sure it does not extend beyond the first thread of the pipefitting.

RESERVOIR INSPECTION

The reservoir has been thoroughly cleaned and sprayed with rust inhibitor at NMSB prior to shipping. It is suggested, however, that the reservoir access covers are removed to re-inspect the tank for cleanliness.

Nasatka Barrier, Inc.

2-Month Visual Inspection Checklist

DESCRIPTION:	OK?	COMMENTS:
E-UP CYCLE (1 - 1.5 SEC.)		
UP CYCLE (3 - 5 SEC.)		
DOWN CYCLE (3 - 5 SEC.)		
HYDRAULIC FLUID LEVEL		
MOTOR RELAY		
HYDRAULIC MOTOR		
SAFETY SWITVH		
DOWN LIMIT		
CYLINDER PINS		
HYDRAULIC HOSES		
HYDRAULIC CYLINDER		
TRAFFIC LIGHT		
RELAYS SYSTEM		
MASTER PANEL/PUSH BUTTONS		
INDICATING LIGHTS		
CHANNEL DRAIN		

NOTES:

SERVICED BY: _____ DATE:

SIGNATURE: _____ DATE:

Trouble Shooting

Trouble shooting a malfunctioning system is as much an art as it is a science. Nasatka's approach to this problem starts with the system design of the electronic control package. We recognize the manufacturer's responsibility to include the long-term maintainability of the system in the basic design package. To this end, Nasatka has included its state of the art programmable controller, not only to allow flexibility in the system control logic, but to also provide a state of the art diagnostic tool for trouble shooting. In this respect, to our knowledge, Nasatka Barrier, Inc. is unique in the industry.

There are only three major assemblies in the NMSB V where problems could occur.

A) Mechanical

B) Electrical

C) Hydraulic

Mechanical problems can usually be diagnosed by close inspection of the various sub assemblies that make up the system. (e.g. a badly worn clevis pin in the cylinder will be immediately obvious when the barrier reverses direction.) Refer to the Mechanical Maintenance section of this manual for suggestions on routine preventative inspection and maintenance.

The same applies to the electrical and hydraulic systems. Routine inspection and preventative maintenance will avoid major problems. Refer to the Electrical and Hydraulic Maintenance sections of this manual for suggestions on routine preventative inspection and maintenance. The balance of this section is devoted to assisting you in isolating the problem area and rectifying the problem.

As previously mentioned, the heart of the system is the electronic control system. The problem can be isolated to one of three possible causes:

A) The input device.

B) The connections between the device and the controller.

C) The controller itself.

A simple electrical test meter will confirm which of the three is the cause of trouble. If the contacts in the input device are functioning normally, the test meter will verify it quickly by checking the continuity at the input device itself. The next step is to check the signal at the control panel. Check the continuity at the appropriate terminals inside the panel. The final step

to determine if the controller has malfunctioned is to check the signal at the terminals on the controller. Refer to Drawing 49550 at the end of this manual for assistance.

If the inputs have been verified to be good, and the barrier still does not perform the desired action, the problem has been isolated to the output side. The electrical test meter makes it simple to check the outputs as well. Let us look at another example.

Say that the barrier does not go to the secure position in response to the up button being pressed. We have already verified that the controller is receiving the signal from the button. Two things must happen for the barrier to move. First, the motor must run (to generate pump output). Second, the solenoid valve must energize (to tell the barrier to go up). Check the output on the controller for the signals. Use the electrical test meter to verify the proper voltage (24 VDC, 115 VAC) is present at the terminals in the electrical control panel. Verify that the proper voltage is also present at the output device (solenoid, light, etc.). Is the electric motor running? Is the valve shifting? Use the Allen wrench in the manual override of the solenoid to verify that the valve is kicking in (refer to Drawing 4027 to identify the proper one). Do all check OK so far? If so, you have isolated the problem to the pump or the cylinder. You did check the oil level in the reservoir, didn't you? Remember, you can see and feel hydraulic flow in the system. Hoses will "jump" in response to changes in pressure and flow. If you "feel" flow in and out of the hydraulic cylinder, you have isolated the problem to leaking piston rings.

A) An input operator is activated.

B) The controller acknowledges the input.

C) The controller sends an output signal.

D) The output device responds (valve shifts, contractor pulls in, etc.).

We at Nasatka Barrier take pride in the quality of our systems. Normal routing preventative maintenance (as suggested) will prevent 95% of the problems with our system. All electrical and hydraulic components are available worldwide. Each component manufacturer has offices and distribution worldwide. These people are also committed to reliable service. Contact Nasatka directly for additional assistance in troubleshooting or for the names of local distributors in your area.

MAINTAINING PROPER OIL TEMPERATURE

Hot oil in your equipments' hydraulic system is one of the one of the primary causes of poor operation, component failure and downtime. Here are some pointers on maintaining proper oil temperature.

The oil in your hydraulic system was designed for operation within a specified temperature range. Your may be able to run it at hotter temperatures for short periods of time, intermittently, without bad effects. If you run continuously with oil tat's too hot, however, your equipment will operate poorly, and eventually key components will fail and halt your machine.

How hot is "Too Hot"?

"Hot Oil" is a relative term. In most cases, 120EF at the reservoir is considered an ideal operating temperature. Always take an oil temperature reading at the reservoir, not at a component or any of the piping.

Some hydraulic systems are designed to operate at 130EF or higher. If you do not know the maximum operating temperature for your equipment, check your component manual for temperature and viscosity limitations.

ISOLATING TROUBLE SPOTS

To determine which components are "running hot" and overheating the oil, feel the outlet fittings and lines at the valves, pumps, and motors. If the oil is normal going into a component, but hot coming out, that could be one of the troublemakers.

If a sticking valve is set too low, part of the oil will be dumped across the valve with every cycle. This too generates excessive heat. Even when all valves are set properly, they may not be operating well because of worn orifices or seals. Always remove and check the hot components first, before the others.

CHECK, SMELL-AND-FEEL

Checking oil temperature periodically is good preventive maintenance. So too is the practice of periodically siphoning an oil sample from the reservoir, and comparing it with a sample of clean, new oil.

Oil that has been running too hot will look darker and feel thinner than new oil. It will also smell burned. Chances are, it will contain more contaminants, because hot oil leads to accelerated wear of component parts.

PREVENTATIVE MEASURES

How can you keep your equipments' hydraulic system from running too hot?

1) Set up a regular schedule for checking the oil temperature, appearance, smell, and feel. Change oil as recommended by the equipment manufacturer.

2) Be prompt about removing and repairing or replacing valves, pumps, or other components that are running hot.

3) If relief or flow-control valves are running hot, check and adjust their settings. Follow your equipment owner's manual.

4) Break in new components gradually. New, close fitting parts expand at different rates, and are especially prone to seize up when they get too hot.

5) Start a cold pump or motor on hot oil by jogging just enough to draw the hot oil into the component. Then wait a few minutes until the temperature on the outside of the pump is the same as that on the piping.

6) Keep your equipment clean. A thick layer of dirt acts as insulation. It will prevent the hydraulic system from getting rid of heat.

7) On hot days, and in hot climates, check and change the oil more frequently. Be sure to use an oil recommended for hot-weather operation by the equipment manufacturer or oil supplier.

8) Be prompt about removing, checking and repairing or replacing valves, pumps or other components that are running hot.

TROUBLE-SHOOTING

Trouble-Shooting Areas

DIRTY OIL

1) Components not properly cleaned after servicing.

2) Inadequate screening in fill pipe.

3) Air breather left off. (No air breather provided; inadequate unit provided; insufficient protection of air breather.)

4) Tank not properly gasket.

5) Pipe lines not properly covered while servicing machine.

6) Improper tank baffles not providing settling basin for heavy materials.

7) Filter dirty or ruptured.

FOAMING OIL

1) Return of tank line not below fluid level. Broken pipe, line left out between a bulkhead coupling and the bottom of the tank after cleaning tank.

2) Inadequate baffles in reservoir.

3) Fluid contaminated with incompatible foreign matter.

4) Suction leak to pump aerating oil.

5) Lack of anti-foaming additives.

MOISTURE IN OILS

1) Cooling coils not below fluid level.

2) Cold water lines fastened directly against hot tank causing condensation within tank.

3) Soluble oil solution splashing into poorly gasket tanks or fill pipes left open.

4) Moisture in replacement fluid cans.

5) Extreme temperature differential in certain geographical locations.

6) Drain not provided at lowest point in tank to remove water collected over possible long operating periods.

OVERHEATING OF SYSTEM

1) Water shut off or heat exchanger clogged.

2) Continuous operation at relief setting:

   A) Stalling under load, etc.

B) Fluid viscosity too high or too low.

3) Excessive slippage or internal leakage:

A) Check stall leakage past pump, motors, and cylinders.

B) Fluid viscosity too low.

4) Reservoir sized too small.

5) reservoir assembled without baffling or sufficient baffling.

6) Pipe, tube, or hose I.D. too small, causing high velocity.

7) Valving too small, causing high velocity.

8) Improper air circulation around reservoir.

9) System relief valve set too high.

10) Power unit operating in direct sunlight or ambient temperature in too high.

FOREIGN MATTER SOURCES IN THE CIRCUIT

1) Pipe scale not properly removed.

2) Sealing compound (pipe dope, Teflon tape) allowed to get inside fittings.

3) Improperly screened fill pipes and air breathers.

4) Burrs inside piping.

5) Tag ends of packing coming loose.

6) Seal extrusions from pressure higher than compatible with the seal or gasket.

7) Human element...not protecting components while being repaired and open lines left unprotected.

8) Wipers or boots not provided on cylinders or rams where necessary.

9) Repair parts and replacement components not properly protected while stored in repair depot. (rust and other contaminants.)

Trouble-Shooting Pumps

PUMP MAKES EXCESSIVE NOISE

1) Check for vacuum leaks in the suction line. (Such as leak in fitting or damaged suction line.)

2) Check alignment with drive mechanism. Misalignment will cause wear and subsequent high noise level in operation.

3) Check manufacturers' specifications relative to wear possibilities and identification or indications of wear at high operating noise level, etc.

4) Check compatibility of fluid being pumped against manufacturers' recommendations.

5) Relief of unloading valve set too high. Use reliable gauge to check operating pressure. Relief valve may have been set too high with a damaged pressure gauge. Check various unloading devices to see that they are properly controlling the pump delivery.

6) Aeration of fluid in reservoir (return lines above fluid level).

7) Worn or damaged gears and housing (gear type pump).

8) Worn or faulty bearing.

9) Reversed rotation.

10) Plugged or restricted suction line or suction strainer.

11) Plugged reservoir filter breather.

12) Oil viscosity too high or operating temperature too low.

13) Oil pour point too high.

14) Air leak in suction line or fitting also causing irregular movement of control circuit.

15) Loose or worn pump parts.
16) Pump being driven in excess of rated speed.

17) Air bubbles in intake oil.

18) Oil level too low and drawing air in through inlet pipe opening.

19) Air leak at pump shaft seal.

20) Suction filter too small or too dirty.

21) Suction line too small or too long.

22) Pump housing bolts loose or not properly torque.

PUMP FAILURE TO DELIVER FLUID

1) Low fluid level in reservoir.

2) Oil intake pipe suction strainer plugged.

3) Air leak in suction line and preventing priming.

4) Pump shaft turning too slowly.

5) Oil viscosity too high.

6) Oil lift too high.

7) Wrong shaft rotation.

8) Pump shaft or parts broken.

9) Dirt in pump.

OIL LEAKAGE AROUND PUMP

1) Shaft seal worn.

2) Head of oil on suction pipe connection - connection leaking.

3) Pump housing bolts loose or improperly torque.

EXCESSIVE PUMP WEAR

1) Abrasive dirt in the hydraulic oil being circulated through the system.

2) Oil viscosity too low.

3) System pressure exceeds pump rating.

4) Pump misalignment or belt drive too tight.

5) Air being drawn in through inlet of pump.

PUMP PARTS INSIDE HOUSING BROKEN

1) Seizure due to lack of oil.

2) Excessive system pressure above maximum pump rating.

3) Excessive torquing of housing bolts.

4) Solid matter being drawn in from reservoir and wedged in pump.

TROUBLE-SHOOTING SOLENOID VALVES

1) Voltage too low. If voltage will not complete the stroke of alternating current (AC) solenoid, it will burn out the coil.

2) Signal to both solenoids of a double solenoid valve simultaneously. One or both of the solenoids will be unable to complete their stroke and will burn out. (Make certain the electrical signal is interlocked so that this condition cannot exist.)

3) Mechanical damage to leads. (Short circuit, open connections, etc.)

4) Tight spool or other mechanical parts of the valve being actuated can prevent the solenoid from completing its stroke and subsequently burning out.

5) Replacement springs too heavy in valve. It can overload solenoid and shorten life.

6) Wrong voltage or frequency will either prevent operation because of inadequate capacity to handle the load with the lower voltage or burn out the could because of improper winding and excessive voltage.

7) Dirty contacts may not supply sufficient current to solenoid to satisfy inrush demands.

8) Low voltage direct current solenoids may be affected by low battery capacity on cold mornings directly after starting cold engine.

9) Long feed lines to low voltage solenoids may cause sufficient voltage drop to cause erratic operation.

SOLENOID VALVE FAILS TO OPERATE

1) Is there an electrical signal to the solenoid or operating device? Is the voltage too low? (Check with voltmeter...test light in emergency.)

2) Has foreign matter jammed the main spool? (Remove end caps and see that the main spool is free in its movement...remember that there will be a quantity of fluid escaping when the cap is removed and provide a container to catch it.)

3) Are solenoids improperly interlocked so that a signal is provided to both units simultaneously. (Put test light on each solenoid lead in parallel and watch for simultaneous lighting...Check electrical interlock. This condition probably burns out more solenoids than any other factor.)

4) Has mounting pad been warped from external heating? (Loosen mounting bolts slightly and see if valve functions. End caps can also be removed and checked for tight spool.)

5) Is the fluid media excessively hot? (Check for localized heating which may indicate an internal leak...check reservoir temperature and see if it is within machine specifications.)

6) Is there foreign matter in the fluid media causing gummy deposits? (Check for contamination...make certain seals and plumbing are compatible with the type of fluid being used.)

7) Is an adequate supply of fluid being delivered to actuate the load? (Many times there is sufficient pressure to shift the valve by not enough to actuate the workload. Check pump supply pressure and volume if necessary... physical measurement of flow through relief valve with units blocked may be necessary.)

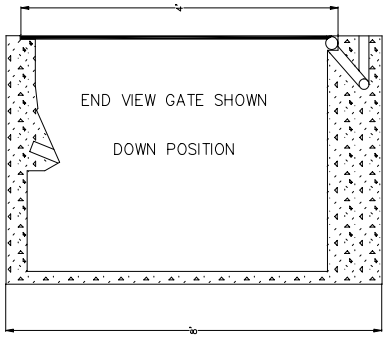
8) Check circuit for possible interlocks on pressure sources to valve or to pilot.

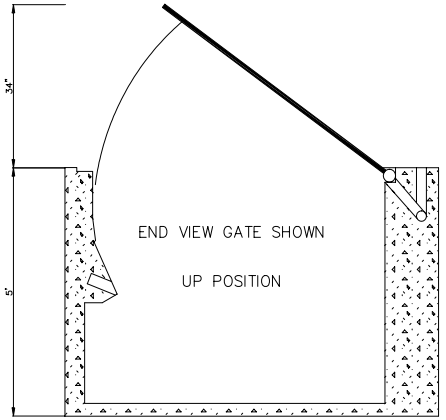
Nasatka Barrier, Inc.
Parts List

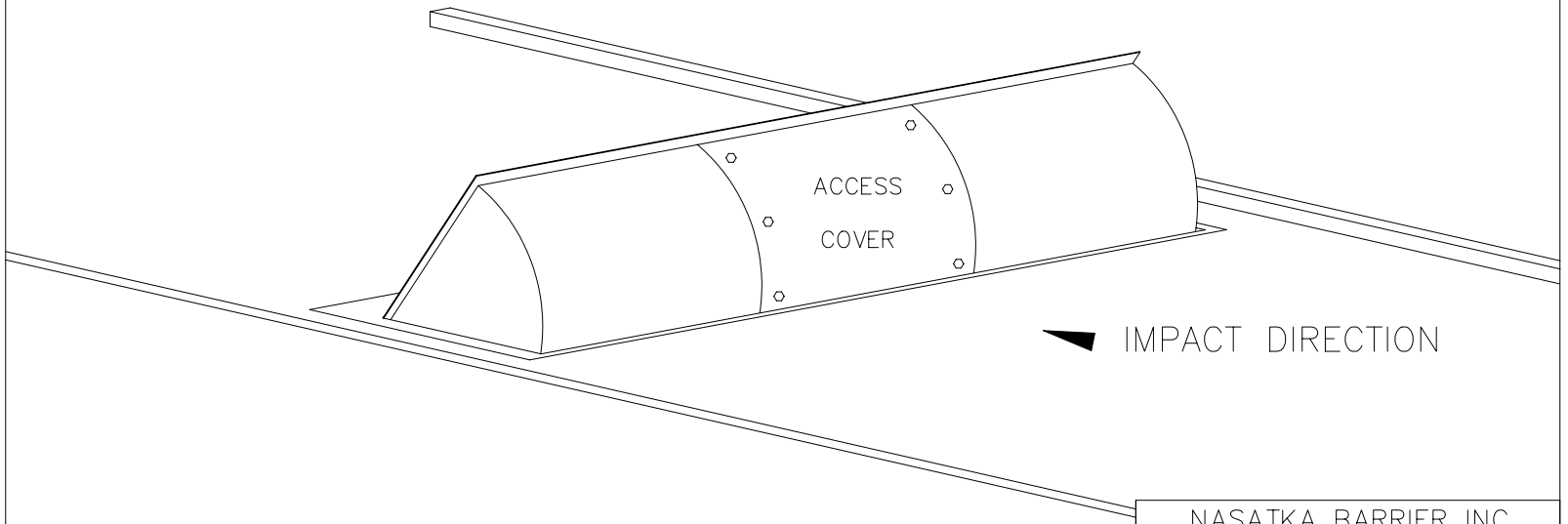
Part	Description
10000	CPU controller
10090	ROD FOR MINI BARRIER TOP/BOTTOM
10091	ROD END MINI BARRIER
10110	7/8" ANCHOR BOLTS
10120	HYDRAULIC MOTOR
10212	SUP-R-RESIN
10125	DRAIN PORT
10130	HYDRAULIC CYLINDER-16" STROKE
10131	HYDRAULIC CYLINDER-13" STROKE
10132	HYDRAULIC CYLINDER-8" STROKE
10133	HYDRAULIC CYLINDER-30" STROKE
10140	HYDRAULIC HOSE
10141	PUMP ASSEMBLY 05
10142	PUMP ASSEMBLY 51
10143	HOUSING PUMP/MOTOR ADAPTER
10144	ACCUMULATOR DRAIN VALVE
10145	FILL PORT
10146	SPEED CONTROL VALVE
10147	EXIT CHECK VALVE
10148	PLASTIC STRAINER AND TUBES
10149	CARTRIDGE SPEED CONTROL VALVE
10150	HYDRAULIC OIL (5 GALLONS) ATF OIL
10151	HYDRAULIC OIL (5 GALLONS) VEG OIL
10152	CHECK VALVE
10155	HYDRAULIC HEATER
10160	HYDRAULIC PUMP (2.06)
10161	PRESSURE GAGE
10162	PRESSURE SWITCH (0-3000PSI)
10165	ACCUMULATOR (0.5 GALLON)
10166	ACCUMULATOR (3 GALLON)
10167	HAND PUMP
10170	PRESSURE RELIEF VALVE
10179	SANDWITCH VALVE WITH MANUAL OVERRIDES
10180	DUAL SOLENOID VALVE
10181	3 WAY SOLENOID VALVE
10182	SPEED CONTROL VALVE
10183	2 WAY SOLENOID VALVE
10184	2 WAY SOLENOID VALVE
10185	2 WAY SOLENOID VALVE
10186	UP/DOWN SOLENOID VALVE BODY
10187	ACCUMULATOR VALVE BODY
10188	CARTRIDGE VALVE
10189	VALVE BLOCK

10190	SUMP STRAINER
10191	UP SOLENOID VALVE BODY
10195	LOW LEVEL SWITCH
10200	CLEVIS PIN
10210	RESERVOIR (.5)
10215	RESERVOIR (1.0)
10216	RESERVOIR (5.0)
10217	RESERVOIR (15.0)
10218	RESERVOIR (10.0)
10220	CONTACT BLOCK N/O
10230	POWER KEY
10231	RESET KEY
10233	TOGGLE KEY LIGHT
10234	TOGGLE SWITCH GATEARM
10235	MUSHROOM BUTTON WITH KEY
10236	RECESS RED BUTTON/LAMP
10237	REMOTE SWITCH
10240	RED PUSH BUTTON/LAMP
10245	RED PUSH BUTTON
10246	WHITE PUSH BUTTON
10250	GREEN PUSH BUTTON/LAMP
10255	GREEN PUSH BUTTON
10260	PANEL LAMP (24V)
10270	LAMP CONTACT BLOCK
10280	PANEL LAMP CAP
10285	CONTACT BLOCK & LAMP
10290	2.5 AMP FUSE
10300	TRAFFIC LIGHT BULB
10310	SINGLE TRAFFIC LIGHT
10320	LIMIT SWITCH
10330	POWER SUPPLY (120 TO 24)
10335	CPU CONTROLLER
10340	4 AMP BRIDGE RECTIFIER
10341	GATEARM RELAY
10350	LIGHT RELAY
10351	24 VDC LIGHT RELAY
10355	RELAY SOCKET
10360	MOTOR RELAY
10370	TERMINAL STRIP-16 POINT
10371	TERMINAL STRIP-24 POINT
10372	TERMINAL STRIP-20 POINT
10373	TERMINAL STRIP-14 POINT
10380	RAM MEMORY CHIP
10390	ANNUNCIATOR

10400	LOOP DETECTOR
10500	SPRING III
10550	SPRING VIIA
10600	PHOTO CELL EMITTER
10610	PHOTO CELL RECEIVER
10611	COUNTER 120VAC
10620	20 AMP FUSE
10640	3-WAY, 2-POLE SWITCH
10641	1-WAY, 1-POLE SWITCH
10645	CONTROL HEAT CABLE
20000	INSTALLATION MANUAL



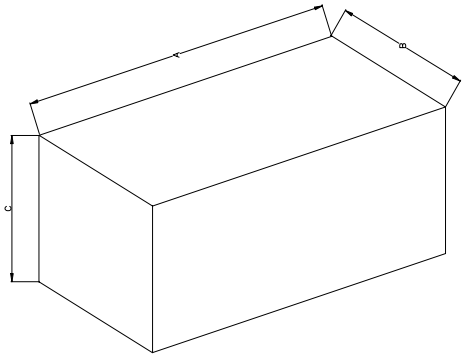




PATENTS NO. 4,850,737 4,574,532
4,630,395 4,818,136 4,826,349
4,839,119 5,228,237 5,288,164
5,466,088 OTHER PATENTS PENDING

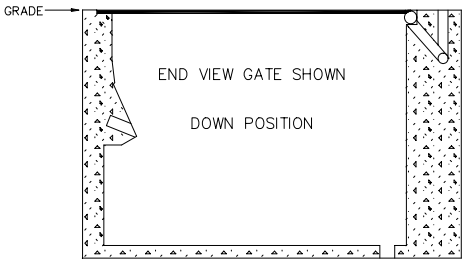
NASATKA BARRIER INC.
8022 OLD ALEXANDRIA FERRY RD. PHONE (301) 868-0301
CLINTON, MARYLAND 20735 FAX (301) 868-0524

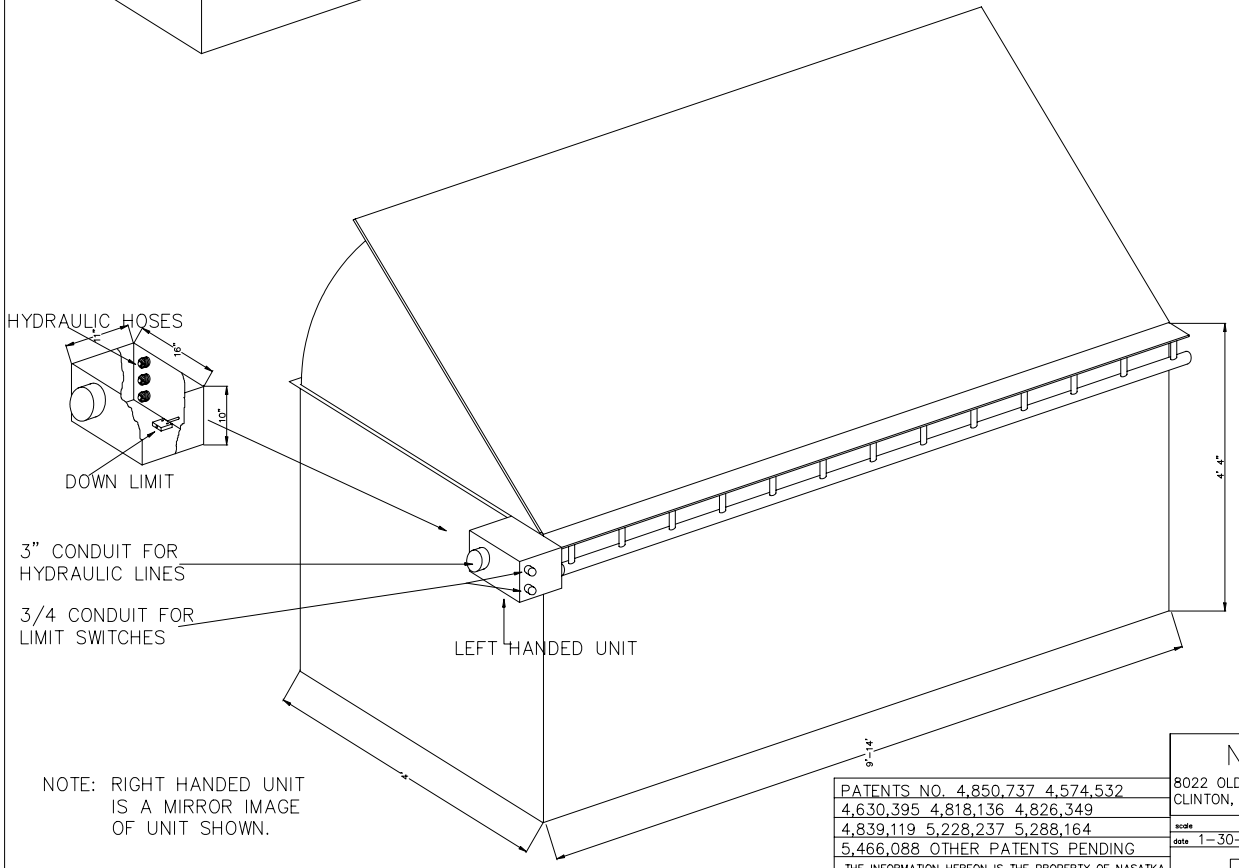
scale date 1-30-00	NMSB-V	dwg by JWS
dwg. NO. 3157		REV. A-1



FOUNDATION

BARRIER	A	B	C
9'	11'	8'	5'
10'	12'	8'	5'
12'	13'	8'	5'
14'	16'	8'	5'





NOTE: RIGHT HANDED UNIT
IS A MIRROR IMAGE
OF UNIT SHOWN.

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4,630,395 4,818,136 4,826,349
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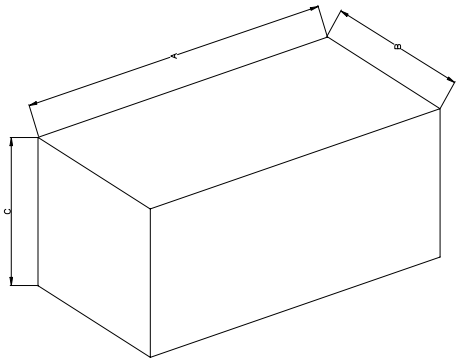
CLINTON, MARYLAND 20735 FAX (301) 868-0524

scale NMSB-V dwg by JWS
date 1-30-00

BARRIER FOUNDATION

dwg. no. 3157-1 REV. B-3



FOUNDATION

BARRIER	A	B	C
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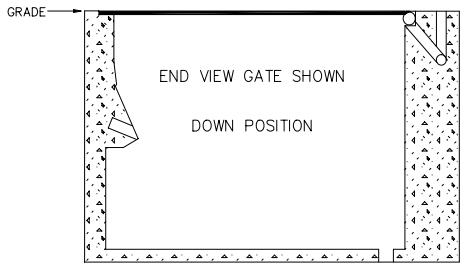
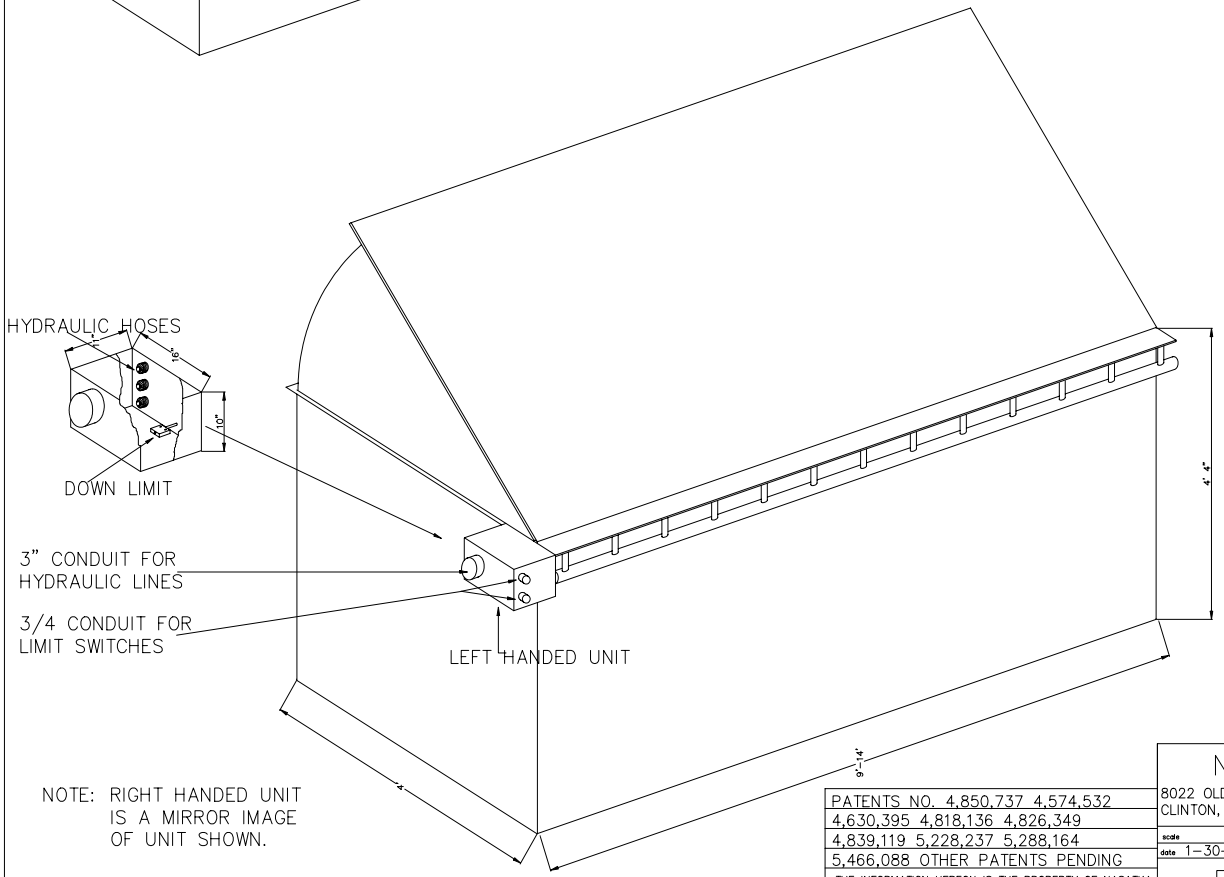
10'	12'	8'	5'
12'	13'	8'	5'
14'	16'	8'	5'





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4,630,395 4,818,136 4,826,349
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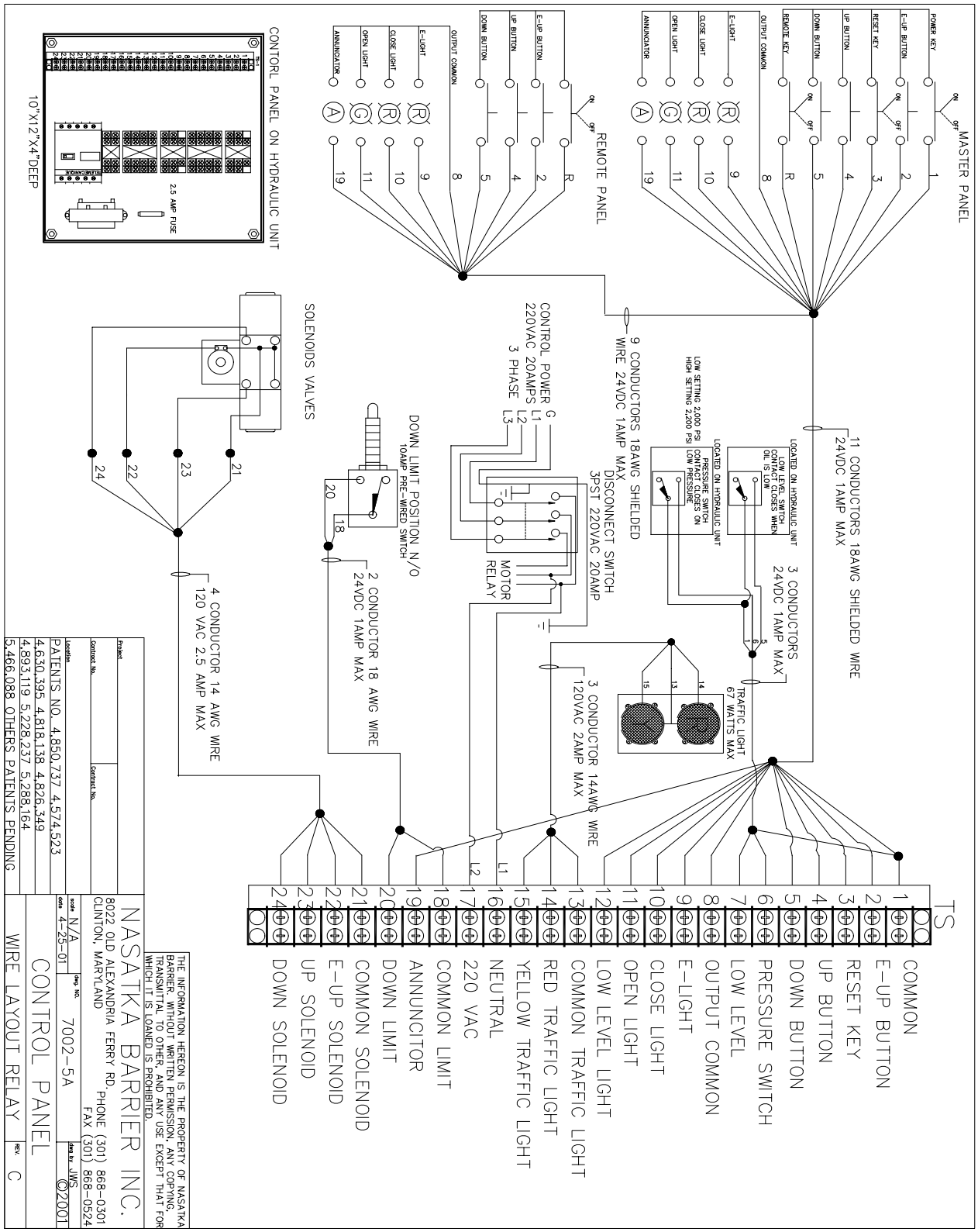
scale	NMSB-V	dwg by JWS
date 1-30-00		

BARRIER FOUNDATION

dwg. NO.	REV.
3157-1	B-3



NASATKA BARRIER INC.
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PHONE (301) 868-0301
FAX (301) 868-0524

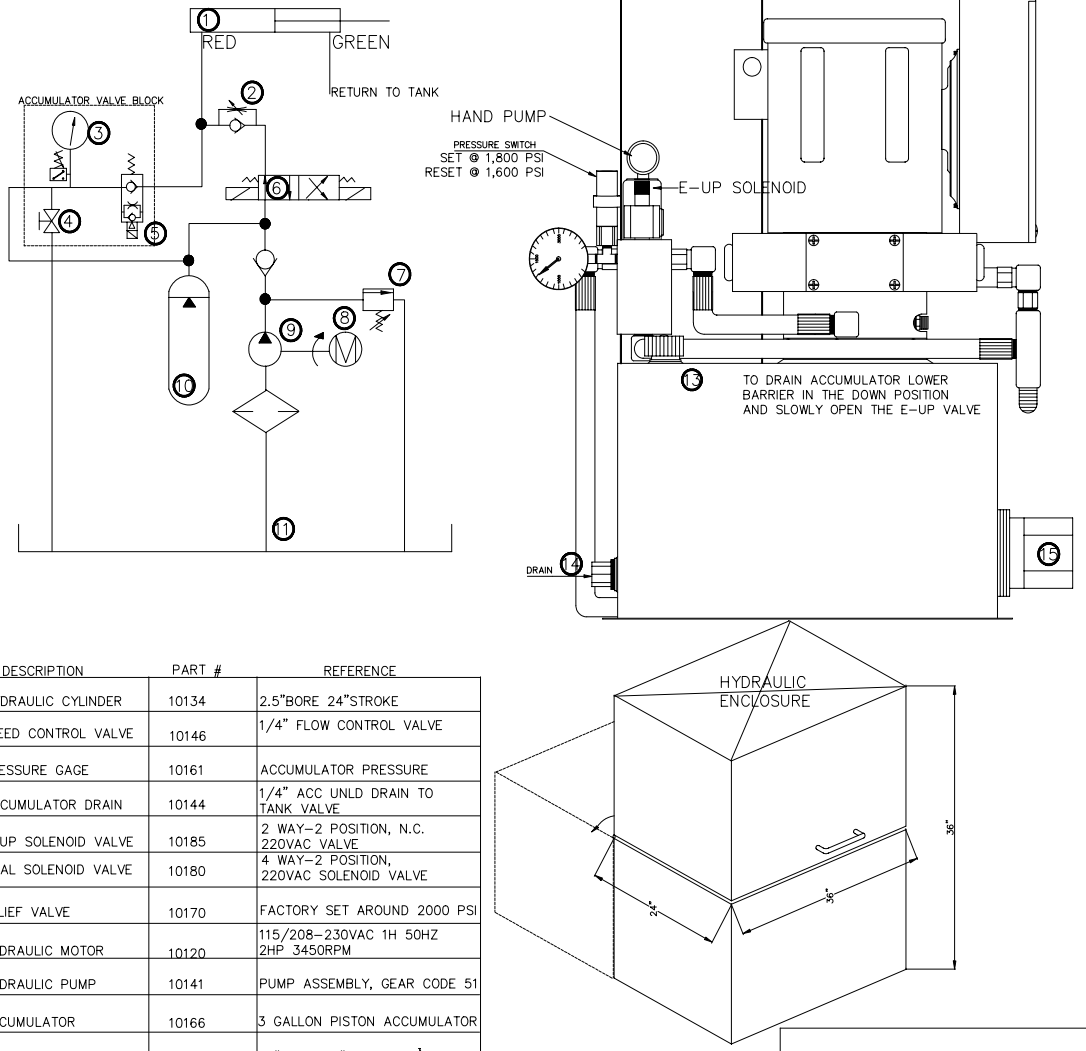
Project
Contract No.
Contract No.
Location
PATENTS NO. 4,850,737 4,574,523
4,630,395 4,818,138 4,826,349
4,893,119 5,228,237 5,288,164
5,466,088 OTHERS PATENTS PENDING

scale N/A	dwg. no. 7002-5A	dwn. by JWS	©2001
date 4-25-01			

CONTROL PANEL

WIRE LAYOUT RELAY

REV. C



	DESCRIPTION	PART #	REFERENCE
1	HYDRAULIC CYLINDER	10134	2.5"BORE 24"STROKE
2	SPEED CONTROL VALVE	10146	1/4" FLOW CONTROL VALVE
3	PRESSURE GAGE	10161	ACCUMULATOR PRESSURE
4	ACCUMULATOR DRAIN	10144	1/4" ACC UNLD DRAIN TO TANK VALVE
5	E-UP SOLENOID VALVE	10185	2 WAY-2 POSITION, N.C. 220VAC VALVE
6	DUAL SOLENOID VALVE	10180	4 WAY-2 POSITION, 220VAC SOLENOID VALVE
7	RELIEF VALVE	10170	FACTORY SET AROUND 2000 PSI
8	HYDRAULIC MOTOR	10120	115/208-230VAC 1H 50HZ 2HP 3450RPM
9	HYDRAULIC PUMP	10141	PUMP ASSEMBLY, GEAR CODE 51
10	ACCUMULATOR	10166	3 GALLON PISTON ACCUMULATOR
11	RESERVOIR	10216	12" SQ.X 10"H, 1155 IN^3
12	PLUG AND VENT	10145	1/4" PLUG AND VENT
13	DRAIN PORT	10125	1/4" DRAIN PLUG
14	HYDRAULIC HEATER	10155	500 WATT HEATER 230 VAC
15			

UP OPERATION

1 Power is on to the control panel; barrier in the down position.
2 Press the up button on the master panel. The up relay will turn on in the control panel and will stay on until the up button is released.
3 Solenoid valve will pull to the left, opening port on the right side of the hydraulic unit.
4 Barrier will begin to raise (speed 5–10 second); there is no adjust up speed, for normal operation.

DOWN OPERATION

1 Power is on to the control panel; barrier in the up position.
2 Press the down button on the master panel. The down relay will turn on in the control panel and will stay unitil the down button is released.
3 Solenoid valve will pull to the right, opening port on the left side of the hydraulic unit.
4 Barrier will begin to lower (speed 5–10 second). to adjust down speed, use down speed control. Turn in to slow, turn out to speed up barrier.
5 When the barrier reaches down position and contacts the down limit, the light relay will engage.

E–UP OPERATION

1 Power is on to the control panel; barrier in the down position.
2 Press the E–up button on the master panel. The e–up and up relay will turn on in the control panel, and will stay on until the E–up is released.
3 Solenoid valve will pull to the left, opening port on the right side of the hydraulic unit and the E–up solenoid will engage.
4 Barrier will begin to raise (speed 1.5 second).
5 When the barrier reaches up position,the down will stay disabled until the reset key is activated.
6 When the reset key is activated the e–up relay will turn off, allowing system to operate normally.

MANUAL OPERATION

1 MANUAL UP: With a 3/16" rod push in on left side of the solenoid valve and the barrier will raise.
2 MANUAL DOWN: With a 3/16" rod push in on the right side of the solenoid valve and the barrier will lower.

MOTOR OPERATION

1 The hydraulic motor will only operate when the pressure in the system fall below 1600 psi. When the system pressure rise to 2000 psi the hydraulic motor will turn off.

Project
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Location
PATENT NO.4,850,737 4,574,523
4,630,395 4,818,136 4,826,349
4,893,119 5,228,237 5,288,164
5,466,088 OTHERS PATENTS PENDING

NASATKA BARRIER INC.
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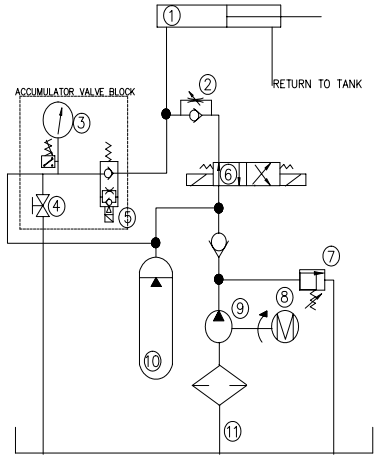
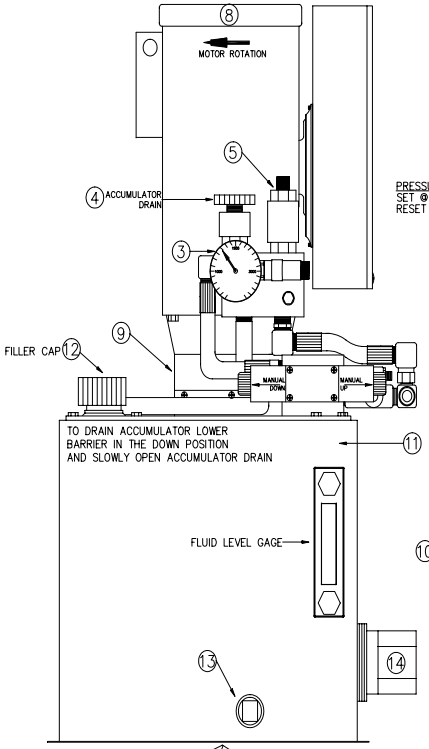
CLINTON, MARYLAND 20735 FAX (301) 868-0524

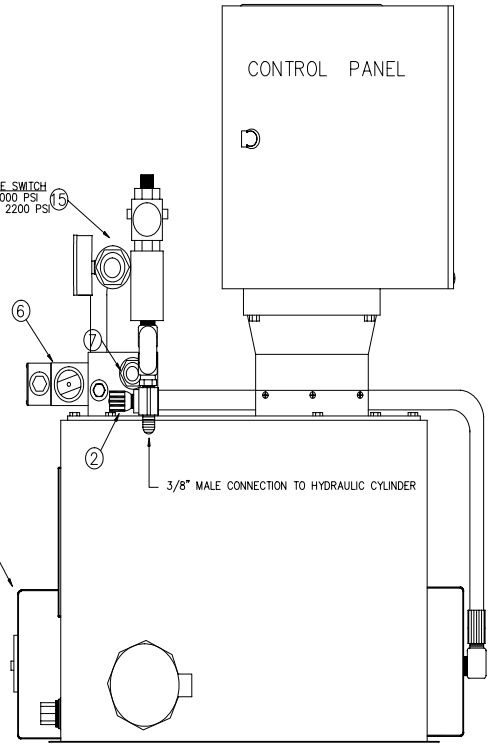
scale N/A | NMSB IV & V | dwg by JWS
date 12-28-99

HYDRAULIC UNIT

dwg. NO. 4027-B REV. B







	DESCRIPTION	PART #	REFERENCE
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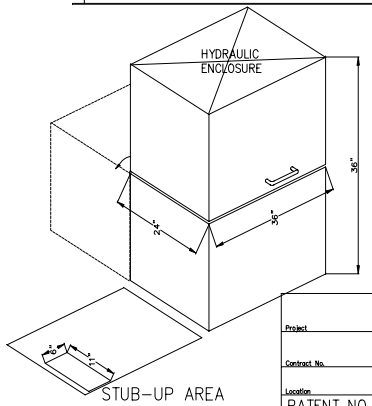
8	HYDRAULIC MOTOR	10120	208–230/460VAC 3PH 50HZ 3HP 3450RPM
9	HYDRAULIC PUMP	10141A	PUMP ASSEMBLY, GEAR CODE 03
10	ACCUMULATOR	10166	3 GALLON PISTON ACCUMULATOR PRE–CHARGED TO 900 PSI
11	RESERVOIR	10217	14" X 17" X 114"H, 2310IN^3
12	PLUG AND VENT	10145	BREATHER FILL CAP & STRAINER
13	DRAIN PORT	10125	DRAIN PLUG
14	HYDRAULIC HEATER	10155	250 WATT HEATER 230 VAC
15	PRESSURE SWITCH	10162	PRESSURE SWITCH 2000–2200 PSIG



STARTUP PROCEDURE

1 Block all traffic during test around barrier.
2 Briefly apply power to the motor and check motor rotation.
3 Check and make sure that accumulator drain is closed.
4 Apply power to the system and allow the pump to bring the system up to the shutoff point 2200 psi.
5 With a 3/16" rod push the right side of the solenoid valve and manually raise the barrier.
6 With a 3/16" rod push the left side of the solenoid valve and manually lower the barrier.

Project
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Location
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4,630,395 4,818,136 4,826,349
4,893,119 5,228,237 5,288,164
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NASATKA BARRIER INC.
8022 OLD ALEXANDRIA FERRY RD. PHONE (301) 868–0301
CLINTON, MARYLAND 20735 FAX (301) 868–0524

scale N/A | NMSB IV & V | des by JWS
date 1–10–01

HYDRAULIC UNIT

dwg. NO. 4027–B REV. B