FMC MODEL 3770/3870 PARALLEL LIFT

OPERATION/ INSTALLATION MANUAL

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OPERATOR'S MANUAL
FMC LIFT MODELS 3770/3870

CONGRATULATIONS! You now own one of the premier lifts on the market today for alignment as well as general mechanical use. Your lift was designed and built to be rugged and durable with a minimum of owner care. There are items which must be attended to on a regular basis, however, to ensure optimal performance and longevity of your lift. These will be explained thoroughly in this manual, so PLEASE READ IT CAREFULLY before operating your lift.

LIFT REQUIREMENTS

Power requirements for your lift are 230V Single Phase AC. Since the lift draws approximately 16 amps of current under normal operating conditions, a 30 amp circuit breaker is recommended on the circuit in which the unit is placed.

The system is electric/hydraulic, with a 3.5 horsepower electric motor driving a hydraulic pump. Maximum line pressure during operation of the lift is 2700 PSI.

Hydraulic oils recommended for use in the lift are Shell Oil Tellus 46, Union 76 46, or equivalent. Any oil meeting these requirements may be used successfully in this lift. The reservoir capacity is 5 gallons, and the level of the oil in the lift should be maintained at that level. Should the oil level be inadequate, the lift's operation will be impaired, and full height extension will not be available to the operator. A full five gallons of the appropriate hydraulic oil is included with the lift from the factory, and must be installed in your lift. By using a funnel and a hose, the installation of hydraulic oil is easily accomplished. It is recommended that the oil in the lift be changed on a yearly basis. To that end, a drain plug is located in the reservoir at the back of the console.

LUBRICATION, (Figure 1):

The lift is provided with 14 lubrication points; two at each of the rear lower pivot points, one at each of the front lower pivot points, one at each of the front and rear upper pivot points, and one at each end of the main hydraulic cylinder. These points must be greased weekly to ensure quiet and smooth operation. The ball bearings located under the rear slip plates should be lubricated using a small amount of WD-40 or dry Silicone. **LUBRICATION MUST NEVER BE DONE ON THE LOCK PLATES, WITH THE POSSIBLE EXCEPTION OF A SMALL AMOUNT OF WD-40 ON THE PIVOT POINT, TO PREVENT RUST!**

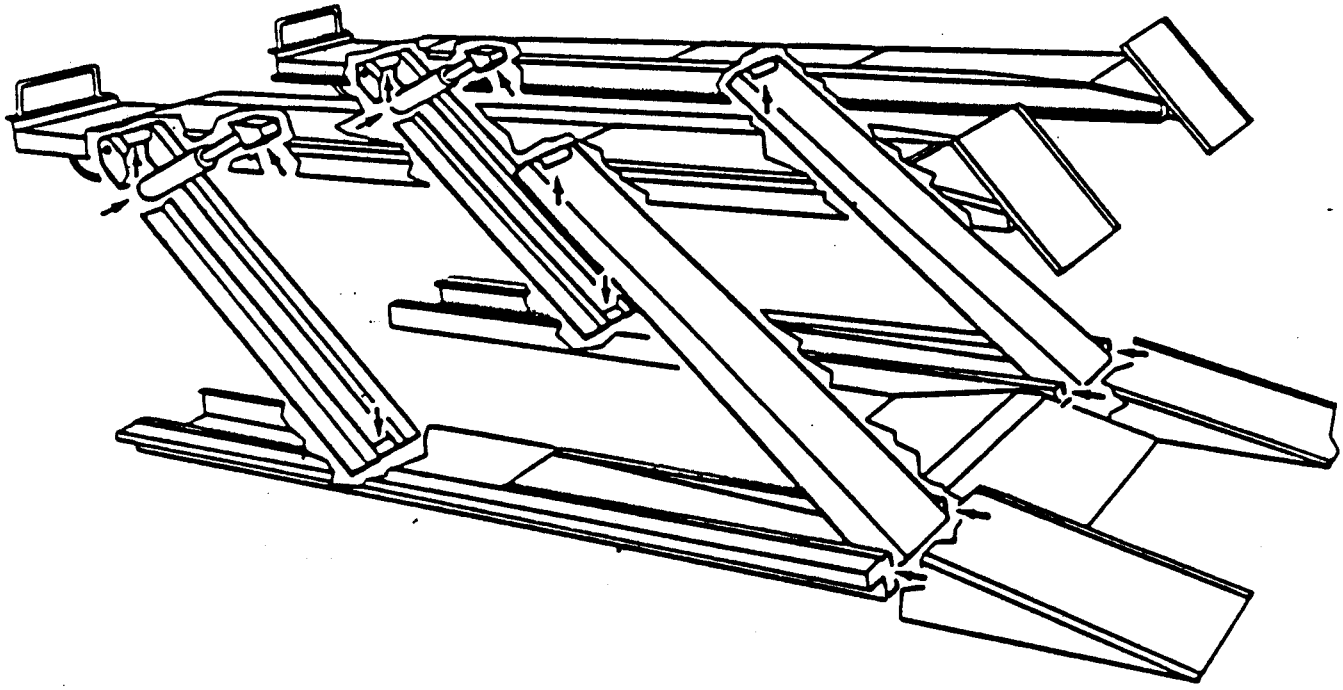
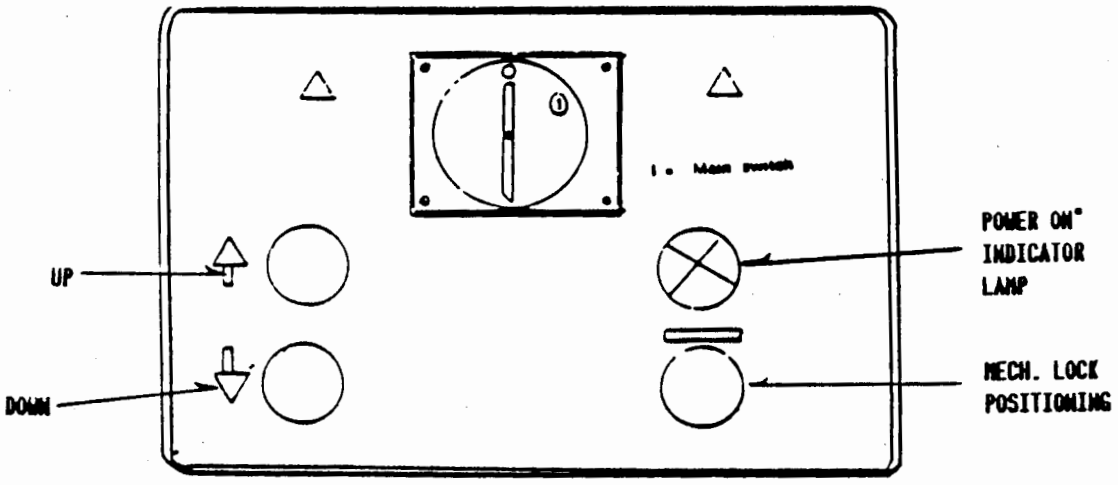


Figure 1

LUBRICATE AT THE POINTS INDICATED BY ARROWS.
USE GOOD QUALITY, WATER RESISTANT GREASE.

Figure 2



Model 78 Jack Lubrication:

By extending the (optional) Model 78 jacks to their highest travel, access is provided to apply grease to its pivot points (6 grease zerks, and two roller slots). Lubricate the jack when lubrication service is performed on the lift.

OPERATION OF THE FMC 3770/3870 (Figure 2)

Operation of your new lift is simple, and easy to learn. Centrally located in the Control Panel is a large two position switch. Turning this switch to the right 90° turns power on to the unit. You will notice that when power is turned on to the unit, a red "Power On" indicator lamp located on the right hand side of the console control panel is lit.

To operate the lift, simply push the UP button, located at the upper left hand side of the control console. The lift will rise. As the lift rises, the locks will drop into position one by one. This is a safety measure which insures that in the unlikely event of hydraulic system failure, the lift will not drop more than a slight amount before locking in position. The lift provides 12 level locking positions, which is especially helpful when using it in conjunction with an aligner.

To lock the lift into position, press the Mechanical Lock Positioning button (Yellow button, lower right hand side of the control console). The lift will descend to the nearest locked position. **Please Note: to ensure maximum operating life from the mechanical locks, ENGAGE THE LOCKS ONLY AFTER AN UPWARD MOVEMENT OF THE LIFT! This ensures full engagement of the locking plates when the lift is lowered into the locked position.**

To lower the lift, press the DOWN button (lower left hand side of the control console). Do not be alarmed when the lift raises a few inches before descending. This is normal, and is designed to allow the lock plates clearance for unlocking. The hydraulic system first sends pressurized oil to the main lift cylinders until the locks clear, then pressurizes the lock disengagement cylinders which move the lock plates to a disengaged position. If it is desired to stop the movement of the lift at any time, simply release the button and the lift will stop. In addition, as a safety measure, the lock plates will automatically swing into their "Ready" position to prevent the lift from descending further. To resume lowering of the lift, it will be necessary to press the DOWN button again, the lift will rise, disengage the locks, and descend.

Safety rails are located along either side of each runway base and are connected via use of limit switches to the console. The purpose of these rails is to prevent the lift from descending should an object be in position over the edge of the lift. If the object is heavy enough to actuate the limit switch, the operator will be unable to lower the lift until he moves the object. In addition, should another person need to stop operation of the lift at any time, this may be accomplished by simply stepping on any of the rails.

EMERGENCY LOWERING OF THE LIFT, (Figure 3):

In the case of power failure during operation of the lift, you are not stuck with a customer's vehicle on your lift. To lower the lift manually, first remove the cover on the rear of the console of the unit, locate the pump handle and the pump (on top of the oleodynamic plate), locate the two levers on the side of the same plate, and do the following:

* Pump the unit until clearance between the locking plates and the main hydraulic cylinders is evident (a helper watching the locks is advised)

* Continue pumping, and press the top lever in toward the body of the unit. Pump until the lock cylinders are fully activated, and the locking plates are fully disengaged.

* Press the lower lever. Keep both the upper and lower levers depressed. The lift will descend as long as BOTH of the levers are kept depressed. However, should one of the levers be released, the lift will stop and the mechanical locks will reengage. While this will not cause any problem with the lift, the amount of work involved will convince the operator not to release the valves until intended.

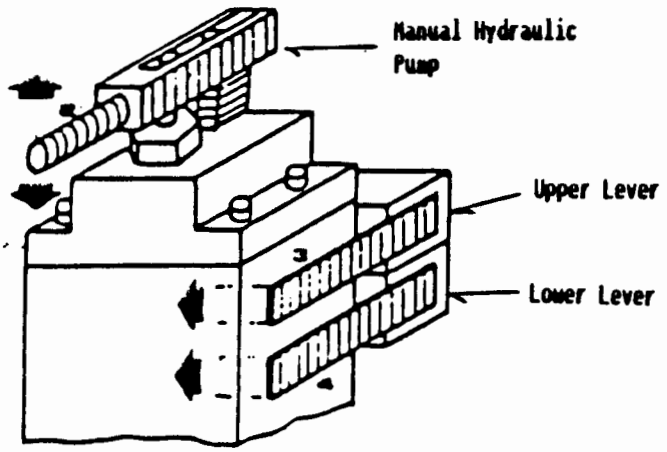


Figure 3

INSTALLATION INSTRUCTIONS:

FMC MODEL 3770/3870 LIFTS

1. TRANSPORTATION:

The simplest method of transportation is a tilt bed, flatbed truck (or car carrier), 2 1/2 to 3 ton capacity. Load the lift on the truck with the approach ramp end (end with the torsion bar bolted between the runways) to the front of the truck's bed. By doing so, the lift will be in the proper position when unloaded at its destination.

2. UNLOADING, (Figure 4):

!!!DON'T DROP IT!!! By using a tilt bed truck, the unit may be transported to its destination, the truck backed up to the bay in which the unit is to be placed, and the lift eased into position.

If a tilt bed truck or car carrier is not available, the lift may be unloaded at its destination by using either a wrecker with an extendable hydraulic boom (15 ton unit recommended); or by using either two forklifts (one on either side of the runways), or one forklift having extended forks and 6000 pound capacity.

Should the lift arrive at its destination via common carrier, use a wrecker to first pull the lift back to the rear of the cargo bed by attaching a cable or chain to the two diamond shaped pickup slots, then attach a cable to the lifting points and pick the lift out of the rear of the bed.

3. PLACING LIFT IN FINAL POSITION:

After unloading the unit, place rollers under the lift's bottom support channels (three to four rollers are sufficient, with four recommended). Steel pipe is the best type for this, as the lift will not have a tendency to crush the roller. Rollers should extend beyond the edges of the lift sufficiently to allow ease of placement and ease of retrieval. The lift may then be rolled into its final position.

4. ATTACHMENT OF HYDRAULICS, (Figure 5):

There are two possible locations in which the hydraulics may be connected; at the left rear of the lift, and at the right rear of the lift. The hydraulic lines are marked "1" and "2" on the back of the console, and the input fittings on the lift are likewise marked "1" and "2". Attach the hydraulic lines from the console to like numbered fittings on the lift. Additional latitude of console placement may be gained through the use of the steel

tubing included with the rack for that purpose. In addition, the tubing may be bent (carefully, so as not to collapse the tubing!) to facilitate placement of the console at almost any reasonable position. HELPFUL HINT: A tubing bender will permit forming the shape of the tubing to your desired configuration. Hook up the hydraulic lines, and install the hydraulic oil (provided) in the reservoir. The reservoir capacity is 5 gallons, and 5 gallons are provided with the unit. Use it ALL. The oil used is Shell Tellus 46, Union 76 46, or equivalent. The hydraulic oil should be changed in the unit yearly.

5. CONNECT POWER TO CONSOLE:

After installing the hydraulic lines, connect the proper (220V, single phase) power to the unit. Place the timers in place, and preset them to 2 and 4 (seconds). The timer located toward the back of the console should be set to 2 seconds, and the timer toward the front of the console should be set to 4 seconds. IN NO CASE SHOULD THE TIMERS BE SET TO LESS THAN 2 AND 4 SECONDS!!! THERE MUST BE A TWO SECOND INTERVAL BETWEEN THE TWO TIMERS!

Turn on power to the lift, and raise it to gain access to the limit switch wiring at the rear of both runway bases. Route the switch wiring through the hole in the side of the runway base (located above the hydraulic line connectors). Attach the limit switch wires to lugs 7 and 9 in the control console (order does not matter). Test the limit switches for operation by operating the lift up and down. If down movement is possible, the limit switches are in their normally closed position. If down movement is not possible, investigate the limit switches and wiring for proper operation and connection.

6. BLEEDING THE LIFT:

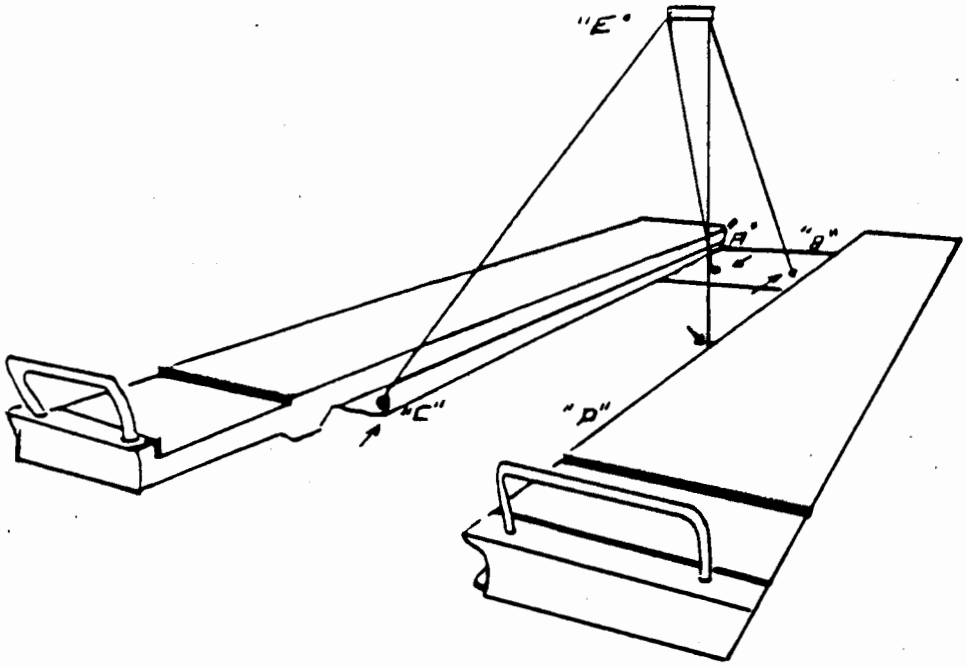
Operate the lift to it's full extension, and back. There is no need to actually bleed the system, since it is self-purging.

7. LEVELLING THE LIFT:

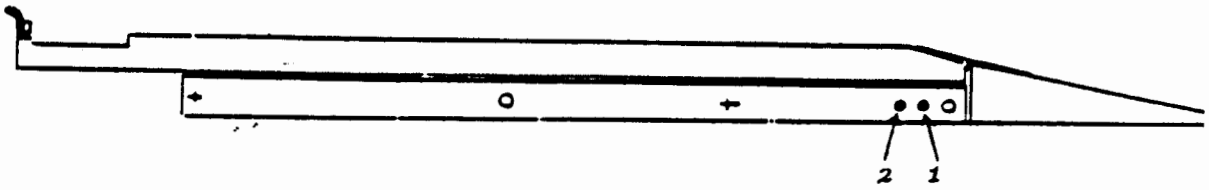
Raise the lift to the third locking position. Lower it into the locked position using the mechanical lock positioning button (YELLOW, bottom Right Hand side of the console). Using a TRANSIT, check at four positions on the lift runways (immediately behind both recesses for turntables on the front of the lift, and immediately in front of the angled ramp at the rear of each of the runways) for equal elevation of the runways. If the runways are NOT level, use the included shims to level them equally at all four points. Placement of the shims under the pivot points of the lift may be simplified by using a short (approximately 2' long) piece of 2" x 4". The process is as follows:

Figure 4

ATTACH CABLE TO POINTS "A" & "B" TO WITHDRAW THE LIFT FROM THE BED OF A COMMON CARRIER.



ATTACH CABLES TO POINTS "A", "B", "C", & "D"; AND ATTACH THE LIFTING APPARATUS (WRECKER, ETC.) AT POINT "E" TO RAISE AND REMOVE THE LIFT FROM THE COMMON CARRIER BOX.



ATTACHMENT POINTS FOR HYDRAULICS.

Figure 5

8. REAR SLIP PLATES - LOCKING MECHANISM:

The FMC 3770/3870 lift is provided with standard integral rear slip plates. Before placing the lift into service, insert the roller bearings in the holes provided (tap into place using an inverted socket and a hammer), and check the bearings for freedom of motion. Some WD-40 or Dry Silicone Lubricant may be sprayed on these bearings to act as a lubricant. **NEVER USE GREASE OR OIL ON THESE BEARINGS!** All heavy lubricants will do is act as an attractor of dirt and debris, and will cause more wear than they will prevent! Place the rear slip plates in place over the plate alignment bar, and test for proper movement and locking.

The locking mechanism is located on the outside of each runway, and consists of a locking knob and an adjustable block. The knob should be adjusted so that full contact is obtained along the back (long axis) of the tip, and the locking block should be adjusted to provide full locking of the slip plates, together with proper operation. (Tight but no straining is the basic rule.)

9. RAMPS:

Approach ramps are provided, and are removable, if such is desired. This feature aids in placing the lift in areas having limited space. These ramps are positioned over pins located at the rear of the lift (two per side).

10. JACKS:

The Model 78 jacks are simply placed in position on the rails located at the inside lower portion of each runway. Freedom of movement is provided by using rollers (two per side of each jack). **PLEASE ENSURE THAT THE PROPER STOPS ARE SECURED IN PLACE AT BOTH ENDS OF THE RUNWAY!** Should the jack be pushed BACK too far, the jack itself, and perhaps even the lift, could be damaged when the lift is lowered. At the front of the lift, should the jack roll off, **PERSONAL INJURY MAY RESULT!!!**

11. COVERS:

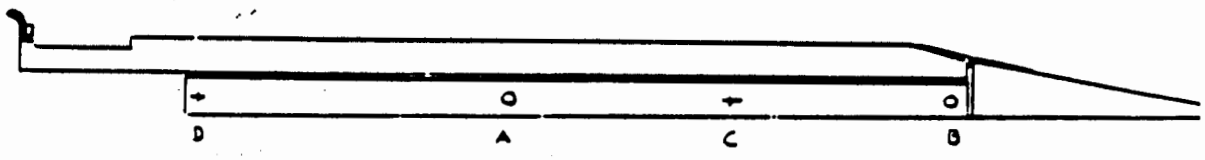
There are covers provided to protect the steel hydraulic lines and the limit switch wiring. Please use them. Likewise, there is an auxiliary cover ramp which fits in place at the rear of the lift. Place it in its position by simply setting it over the torsion bar at the rear of the lift between the runways.

12. SECURING THE LIFT IN PLACE:

* Raise the lift from it's locked position.
* Place the 2 x 4 (vertically) under the outside edge of the runway. Rest the other end of it on the floor.
* Lower the lift (using either the Mechanical Lock Positioning button or the DOWN button) until the lift hydraulics cause the lift base to raise enough to allow shim pack placement.
* Press the UP button. This will allow the lift base to settle on the shim pack, and will allow you to remove the 2 x 4.
* REMEASURE TO CHECK LEVEL.
* Repeat the above steps as necessary to obtain level of the lift.

Please Note: placement of the shims **MUST BE DIRECTLY BELOW EACH OF THE BOTTOM PIVOT POINTS OF THE LIFT! The sheet metal of the lower portion of the lift is not strong enough to support the weight of the lift! Put the levelling shims only below pivot points (see Figure 6). In like manner, the shims MUST BE FULL WIDTH!!! Washers, or similar shimming CANNOT BE USED!** It is recommended that this lift be levelled very carefully. To obtain perfect level of the lift, utilize the drilled and tapped holes and fine adjustment bolts (provided), thread them through the base and use them to fine tune the level of the lift. After levelling the lift using these bolts, add the required shims to hold the level position, then remove the bolts (they cannot be used to maintain level of the lift and they could cause damage to the lift if left in place!). Add secondary (fill in) shims to the front and midway between the pivot points of the base.

Figure 6



A - B : PIVOTING POINTS MAIN LEVELING LOCATIONS
C - D : SECONDARY SHIMMING POINTS

The factory provides positions for four mounting bolts to be placed in the concrete of the shop floor. Since no particular strain is placed on these bolts under any normal conditions, 1/2" REDHEAD or equivalent concrete anchors, properly used, are sufficient for the purpose.

13. LUBRICATION: See Operator's Manual Section.

14. TROUBLESHOOTING THE LIFT:

A. If the motor runs but the lift does not go up, look for the following:

* Hydraulic lines may be reversed
* Oil tank may be low on hydraulic fluid
* Oil pressure may be low. The operational pressure is 2700 PSI and should be checked at the pressure tap in the oleodynamic plate (at the upper left hand side of the plate) above the hydraulic reservoir.

B. If the motor does not run, check the following:

* Check the breakers on the contactor (three in vertical line with one another)
* Check the fuses
* Check input power
* Check and reset the thermal cut out

C. Lift does not come down:

* Ensure that the Flow Control valve in the return hydraulic line is not reversed.
* Check the safety bars. Bounce the safety bars flanking both runways to ensure full extension of the springs which support them.
* Check the timers. First check should be on the timer which is set to 4 seconds or more.
* Check to ensure proper activation of the 40mm cylinder, and proper disengagement of the mechanical lock plates.
* Check the safety valve in line #1 for malfunction.
* Check for power to the electrovalves (24V)

NOTE: A check of the function of the limit switches may be made by bridging pins 7 and 9 of the terminal block. If the lift will function when these pins are bridged (bypassing the limit switches) the limit switches are activated, are faulty, or the wiring going to them is faulty.

D. If the lift raises, stops, and the locks release, but the lift will not come down, check the safety valves at the bottom of the main cylinders. Clean or replace.

15. EMERGENCY LOWERING OF THE LIFT: See Operator's Manual Section.

WHAT HAPPENS IF:

You push the Down Button and...

1- nothing happens.... (Motor does not run and lift does not come down) then..... Check the limit switches. Make sure that the connections is properly made. If nothing happens again, make a bridge with a small wire between 7 and 9. If the motor runs and the lift comes down, retrace the wires of the limit switches.

2- Lift goes up, locks do not release.....
Check the Timers and change the one that is registered at 4 seconds or above.

3- Lift raises, stops, locks release, but lift does not come down:
then.... Check the safety valves at the bottom of the main cylinders. They may have intervened. Remove them and clean them up thouroughly, or replace them.

HAND PUMP

What to do in case of power failure when the lift is raised.

1- Take out the lever from its location inside the control unit and place it on the pump supprt (2).

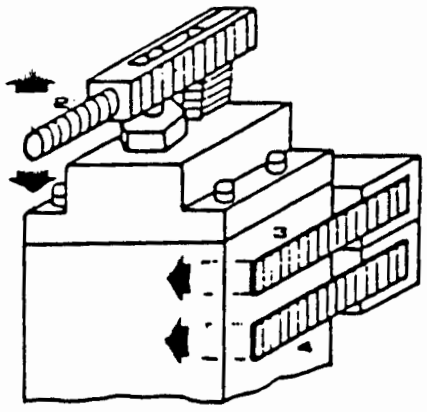
2- Pump in the sense indicated by the arrows until the mechanical safety locks will be released of at least 1/5 of an inch from the hydraulic cylinder.

3- Press lever (3) in the sense indicated by the arrow and pump continuously until the mechanical safety locks are released completely.

4- Stop pumping and press simultaneously levers (3) and (4) up until the lift has reached the base.

WARNING

OPERATOR MUST KEEP THE LEVERS (3 and 4) PRESSED UP UNTIL THE LIFT HAS REACHE THE GROUND, OTHERWISE, AS SOON AS ONE OF THE LEVERS IS RELEASED, THE LIFT WILL STOP AND MECHANICAL LOCKS WILL RE-ENGAGE.



Published/Sent - October, 1988

3770/3870 LIFT TROUBLESHOOTING AND OPERATIONS GUIDE

FOR FIELD TECHNICIANS

UNIVERSAL CAPACITOR #69396 - Replaces OMER FMC/OMER CAPS. - Replace on 1-1 basis - Replace all at same time

This manual is designed to assist you in understanding and troubleshooting the FMC Model 3770 and 3870 lifts. Please refer to the composite drawings of the electrical and hydraulic system (Fig. 1, 1A), and to the individual systems diagrams for sequential operation steps of the 3770 and 3870 lifts. Remember that both units operate identically.

SEQUENTIAL OPERATION STEP - 3770/3870 LIFTS

"UP" CYCLE OPERATION (Fig. 2, 2A)

1. Push the "UP" button:

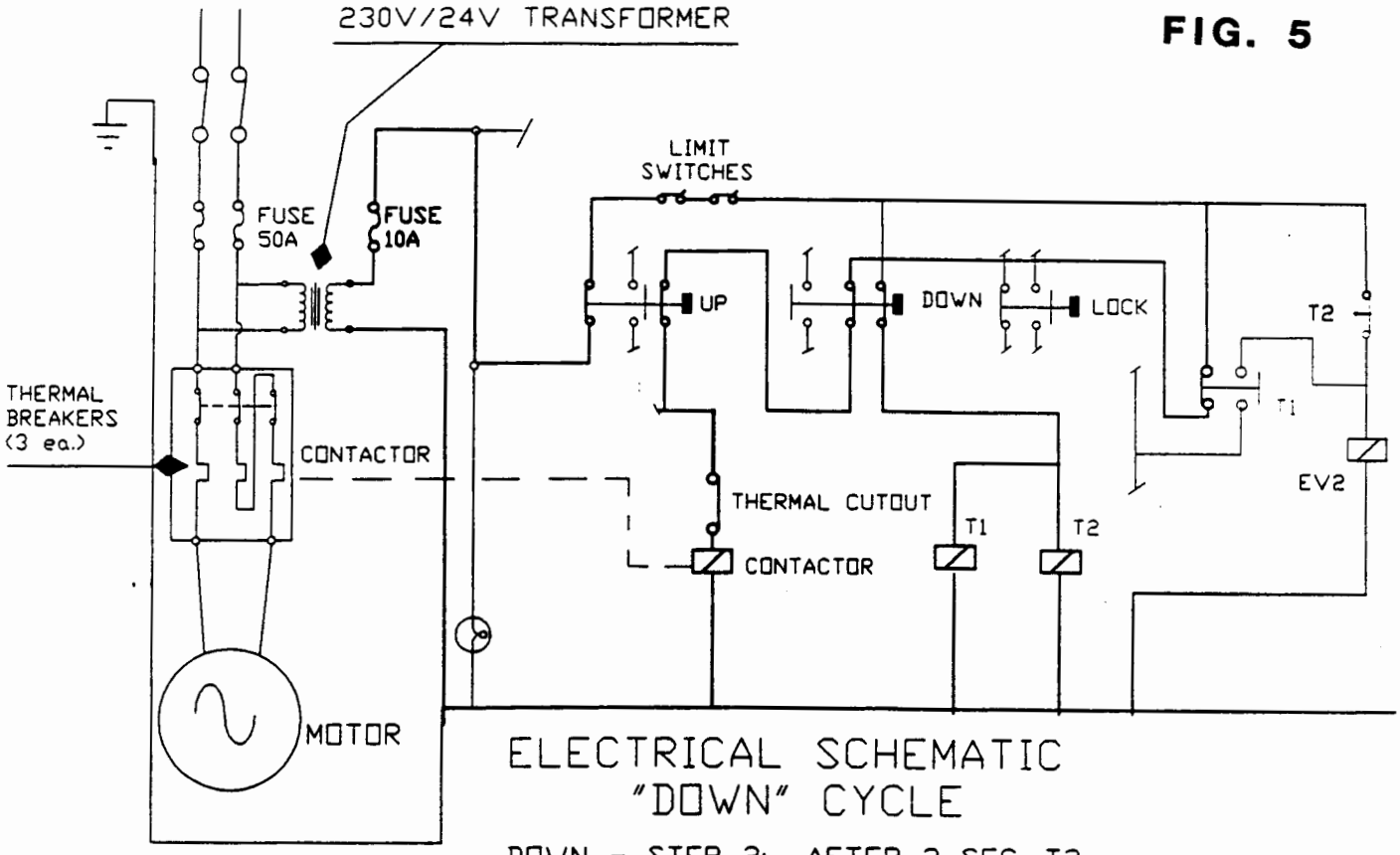
   A. Contactor is closed. Motor runs.

   B. Motor drives pump through flexible coupling.

   C. Hydraulic fluid is forced through the check valve, EV1, the flow control valve, the hydraulic lines, and the hose break valves.

   D. Main hydraulic cylinders fill - lift raises.

FIG. 5



ELECTRICAL SCHEMATIC "DOWN" CYCLE

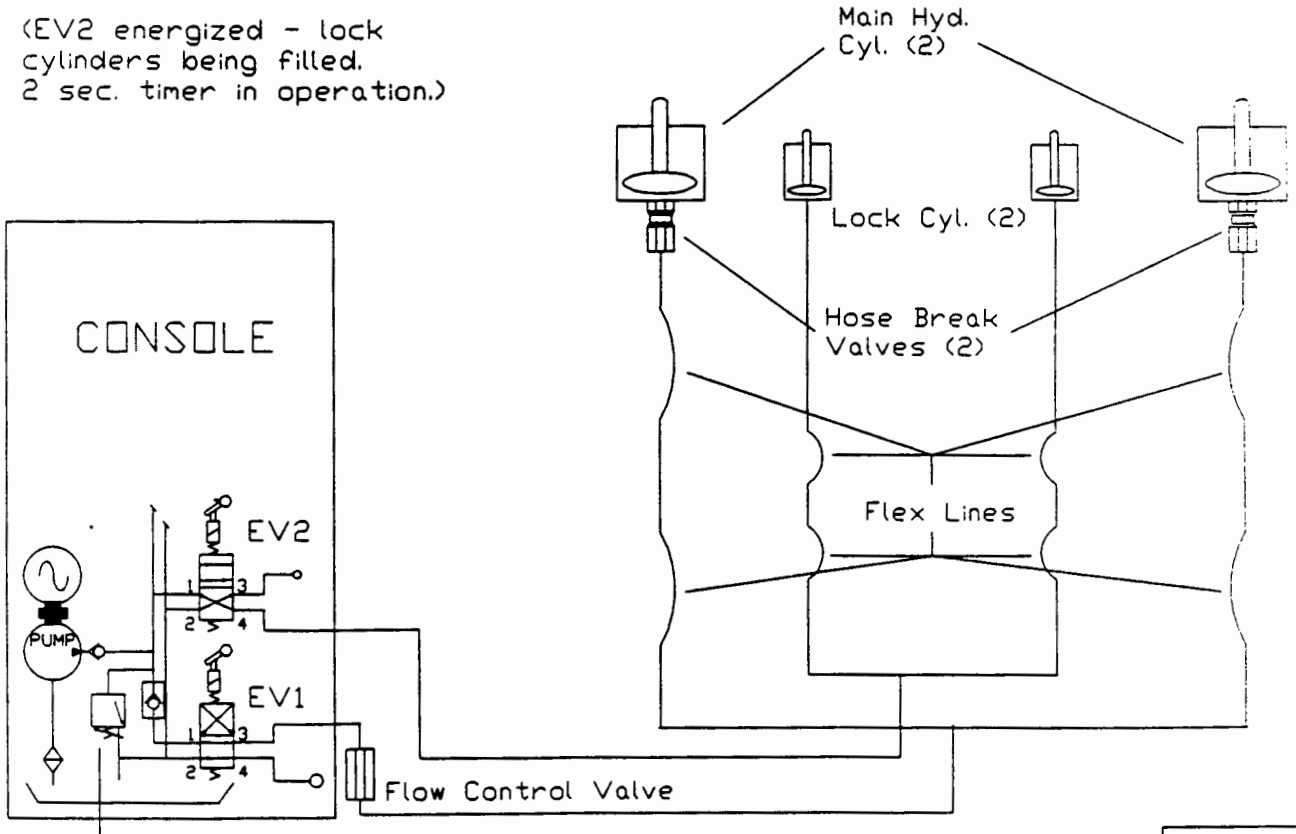
DOWN - STEP 2: AFTER 2 SEC. T2 ENERGIZES EV2, RELEASING LOCKS MOTOR CONTINUES TO RUN.

3770DN2

FIG. 5A

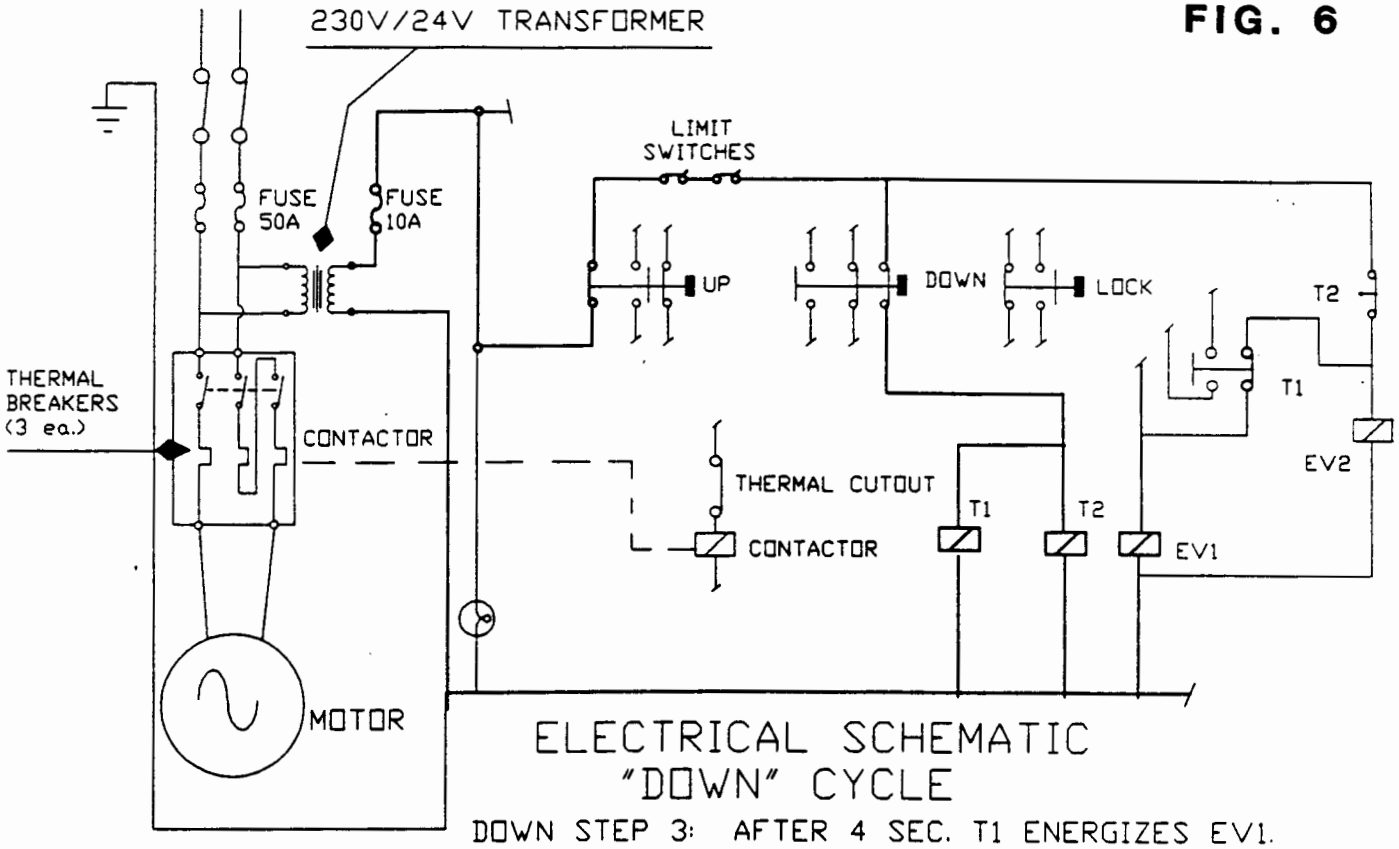
HYDRAULIC SCHEMATIC - DOWN CYCLE (PART 2)

(EV2 energized - lock cylinders being filled. 2 sec. timer in operation.)



3770HDN2

FIG. 6



ELECTRICAL SCHEMATIC
"DOWN" CYCLE

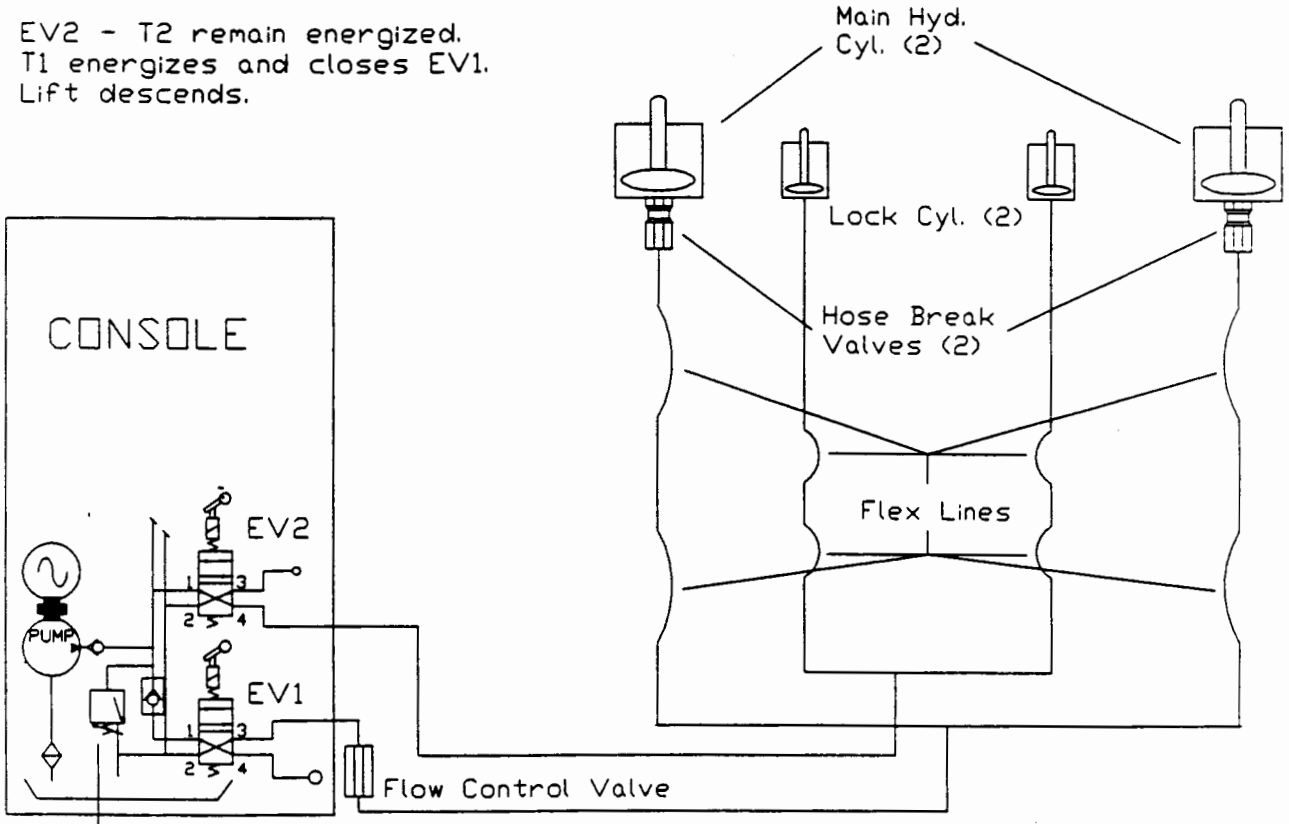
DOWN STEP 3: AFTER 4 SEC. T1 ENERGIZES EV1. CONTACTOR IS DE-ENERGIZED. HYDRAULIC FLUID FLOWS INTO RESERVOIR FROM MAIN CYLINDERS. EV2 REMAINS ENERGIZED.

3770DN3

FIG. 6A

HYDRAULIC SCHEMATIC - 'DOWN' CYCLE (STEP 3)

EV2 - T2 remain energized.
T1 energizes and closes EV1.
Lift descends.



3770HDN3

STEP ONE "DOWN" CYCLE SUMMARY

During this portion of the "DOWN" cycle, the motor runs and the lift is raised off of the locks. At this point, no oil is flowing into the lock release cylinders. The only oil flow is into the Main hydraulic cylinders.

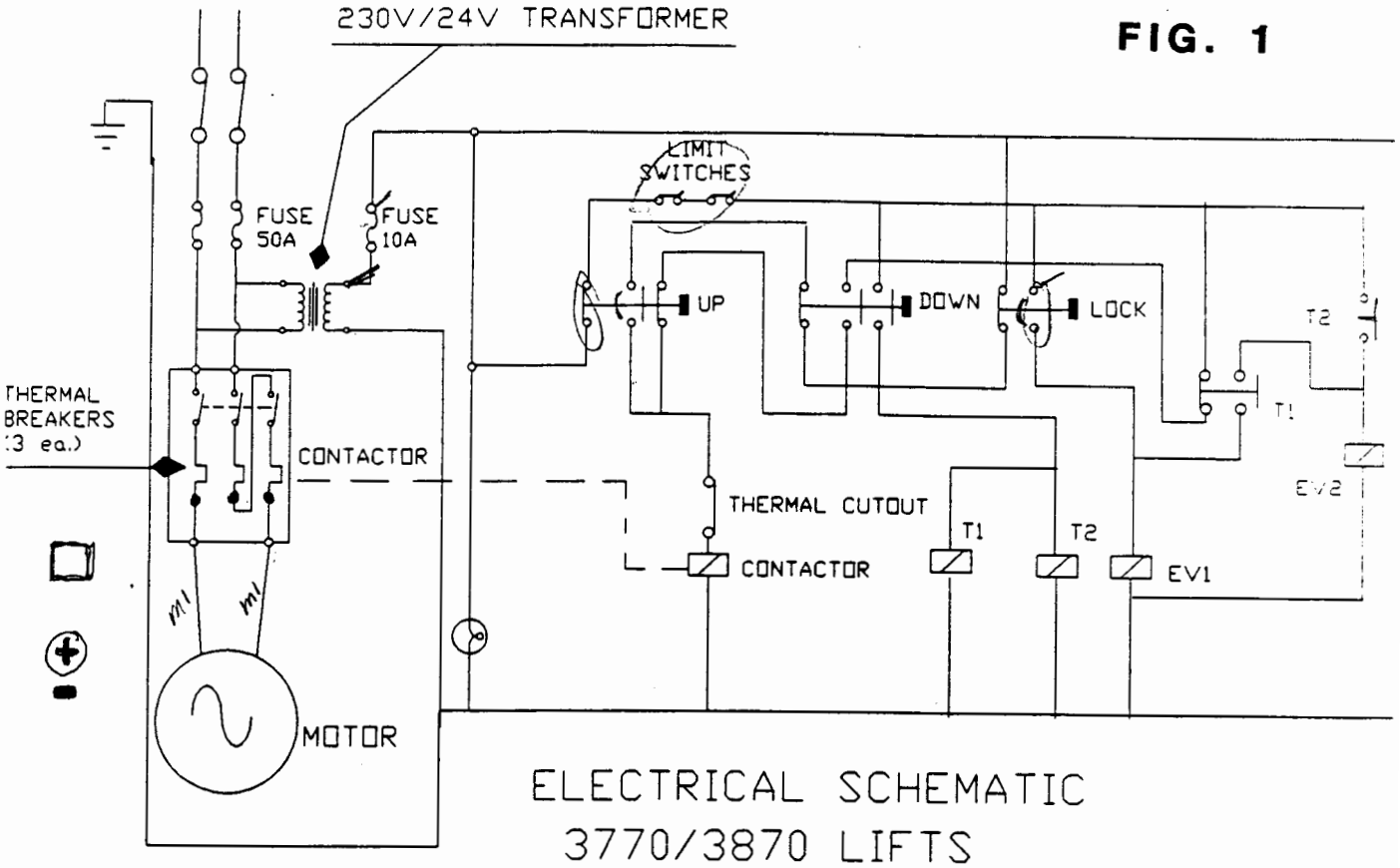
If any of these components are defective, the lift will not raise from the locked position, and will not be able to release the lock plates. No other components in the system other than those listed are involved.

3. CRITICAL COMPONENTS; STEP TWO - "DOWN" CYCLE (Fig. 5, 5A):

A. ELECTRICAL

1. Switch - ON/OFF
2. 50A fuses
3. Transformer
4. 10A fuses
5. Upper and lower contacts of "UP" switch
6. Limit switches
7. Upper and middle contacts of "DOWN" switch
8. Lower contacts of T1 timer
9. T2 timer
10. Contactor
11. Thermal breakers in contactor (3)
12. Motor

FIG. 1



ELECTRICAL SCHEMATIC
3770/3870 LIFTS

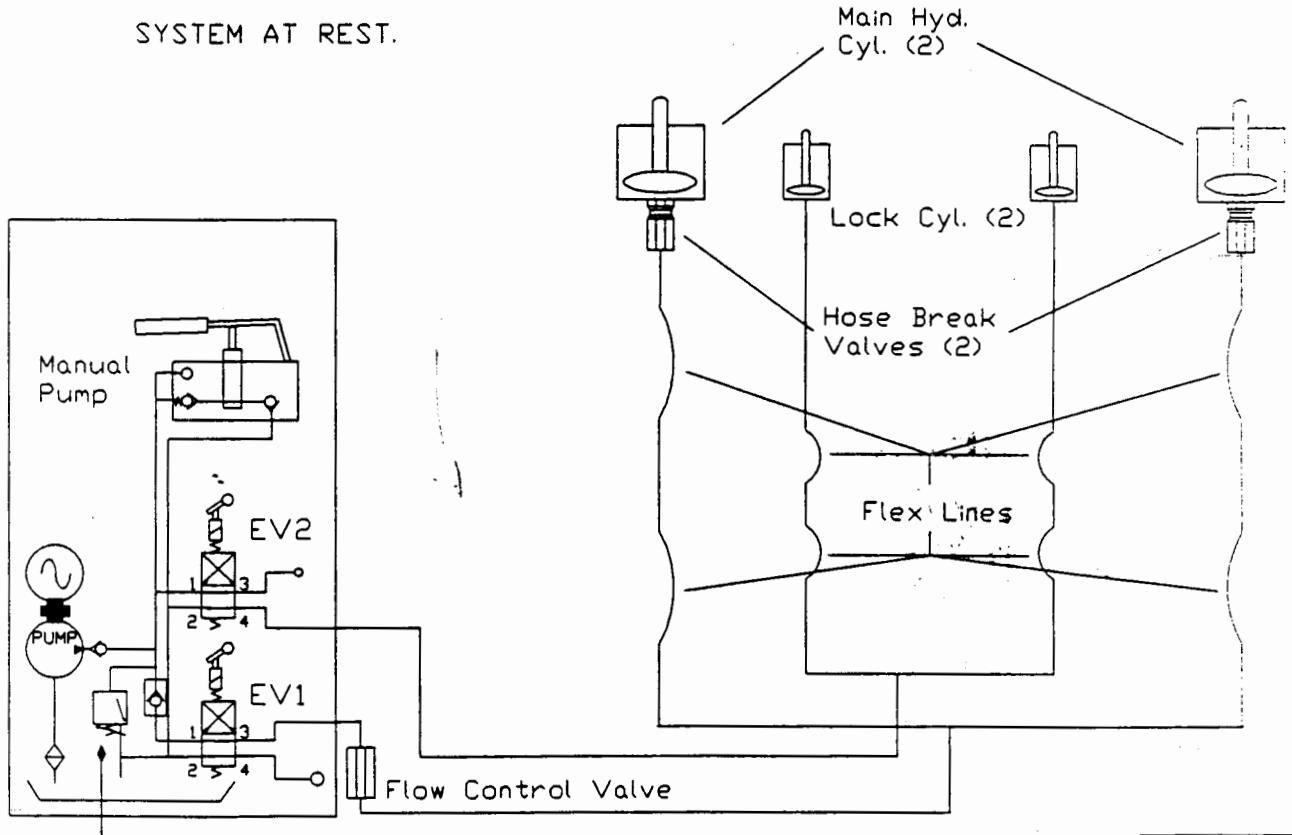
UNIT AT REST.

3770COMP

FIG. 1A

3770 HYDRAULIC SCHEMATIC

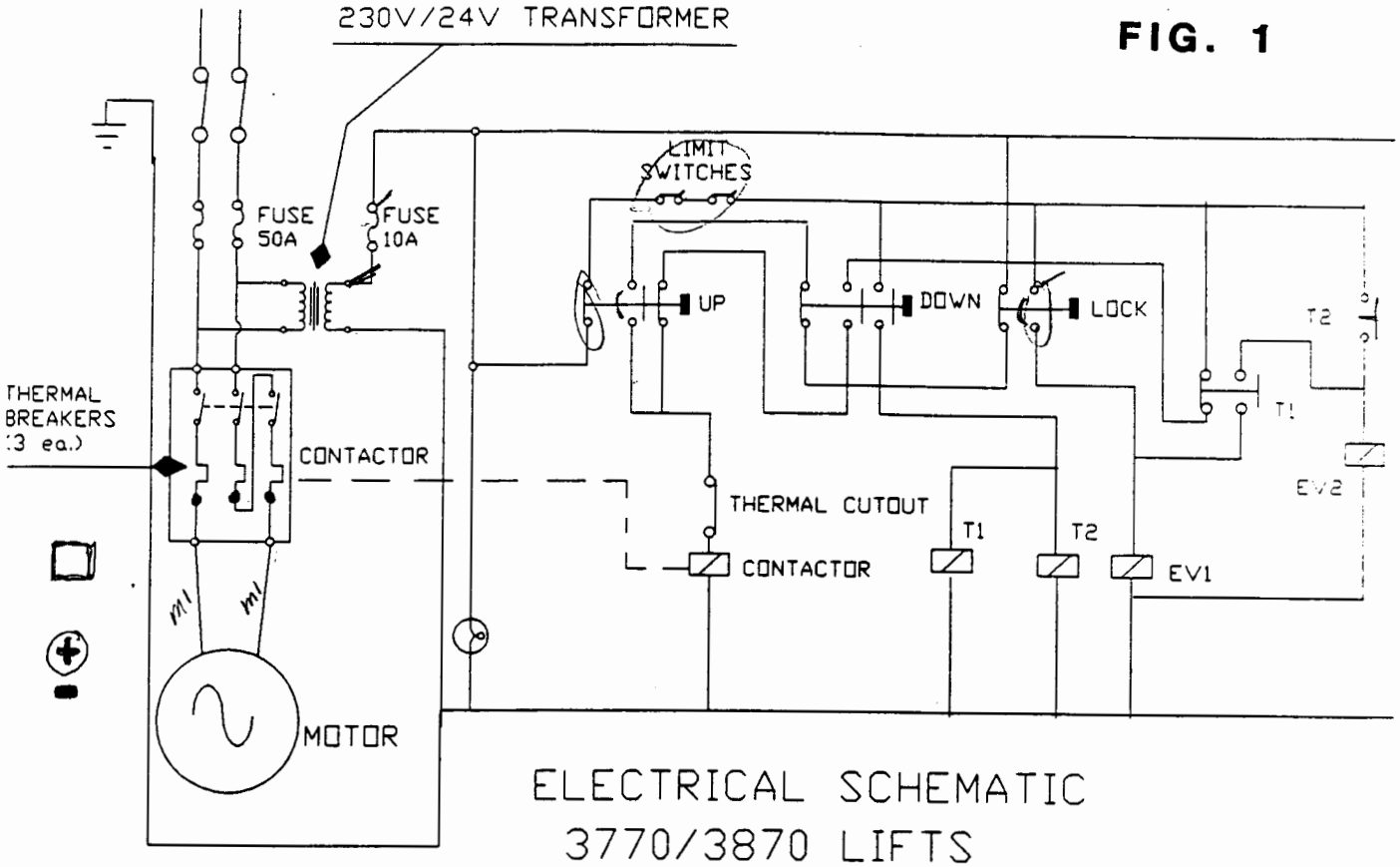
SYSTEM AT REST.



Pressure Control (Overpressure Relief) Valve. Normally closed.

3770HYDS

FIG. 1



ELECTRICAL SCHEMATIC
3770/3870 LIFTS

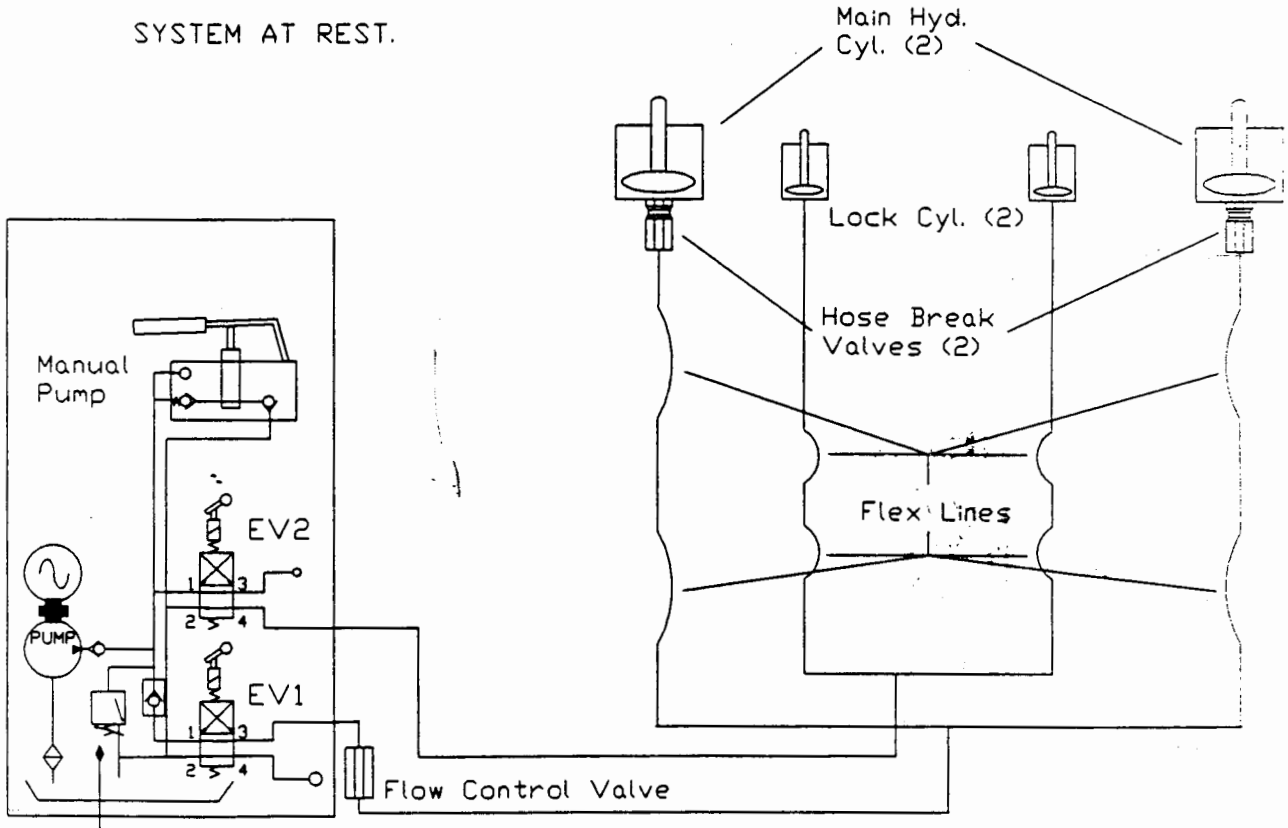
UNIT AT REST.

3770COMP

FIG. 1A

3770 HYDRAULIC SCHEMATIC

SYSTEM AT REST.



Pressure Control Valve. (Pressure Relief) Valve. Normally closed.

3770HYDF

2. CRITICAL COMPONENTS; STEP ONE - "DOWN" CYCLE (FIG.4, 4A):

A. ELECTRICAL

1. Switch - ON/OFF
2. 50A fuses
3. Transformer
4. 10A fuse
5. Upper and lower contacts of "UP" button
6. Limit Switches
7. Upper and middle contacts of "DOWN" button
8. T1 timer
9. Contactor
10. Thermal Breakers
11. Motor
12. Wiring harnesses

B. HYDRAULIC

1. Pump
2. Check Valve (internal)
3. Pressure Relief Valve (must remain closed)
4. EV1
5. Flow control valve
6. Hydraulic lines
7. Hose break valves
8. Main hydraulic cylinders

B. HYDRAULIC

1. Hydraulic pump
2. Check valve (internal)
3. EV2
4. Flow control valve
5. Hydraulic lines
6. Lock cylinders
7. Main hydraulic cylinders (lift still raising)
8. EV1 (lift still raising)

STEP TWO "DOWN" CYCLE SUMMARY

T2 timer has activated (after two seconds) during this step. This opens EV2 and allows the motor to pump hydraulic oil into the lock release cylinders. While the lock release cylinders are being filled, the lift stops raising momentarily. The motor continues to run at this stage and continues to raise the lift after the lock cylinders are filled and the locks are retracted. T1 timer continues to time its four second cycle. No components other than those listed are involved in this portion of the "DOWN" cycle.

3. CRITICAL COMPONENTS; STEP THREE - "DOWN" CYCLE (FIG. 6, 6A):

A. ELECTRICAL

1. Switch - ON/OFF
2. 50A fuses
3. Transformer
4. 10A fuse
5. Lower contacts of "UP" button
6. Limit switches
7. Upper contacts of "DOWN" button
8. T1 and T2 timers

B. HYDRAULIC

1. EV1 and EV2
2. Lock release cylinders
3. Hose break valves
4. Hydraulic lines
5. Flow control valve
6. Main hydraulic cylinders

STEP THREE "DOWN" CYCLE SUMMARY

During this portion of the "DOWN" cycle, EV1 and EV2 are energized, opening their respective valves. When T1 timer energizes, the contactor is no longer powered and the motor shuts off. The lift will descend until the "DOWN" button is released, or until it comes to rest on the floor. No components other than those listed are involved in this portion of the cycle.

TROUBLESHOOTING THE POWER PANEL OF THE 3770/3870 LIFTS

* All measurements taken on the wiring block.

1. Disconnect M1 and M1 on the wiring block to prevent motor operation. Wrap and secure these wires away from the block.

2. Check for 24V AC between terminals 1 and 7 and 1 and 9 on the wiring block. This verifies that the safety switches are closed. If no AC is available, troubleshoot the safety bars, limit switches, and wiring.

3. Push and hold the "UP" button. Verify that there is NO AC between terminals 1 and 9 on the wiring block. Listen for the sound of the contactor closing. This step checks current through the "LOCK" button, "UP" button, and "DOWN" button. (See system wiring diagrams.) Check fuses for continuity. Verify 230V AC between M1 and M1 terminals on the wiring block. Verify proper functioning of the contactor, and continuity through the thermal cutouts (ohms checks - power off).

4. Release "UP" button. Check for 24V AC between terminals 1 and 9.

5. Push and hold the "DOWN" button. Check IMMEDIATELY for 230V AC between M1 and M1 on the wiring block, and for cutout (loss) of 230V AC after approximately 4 seconds. Troubleshoot T1 timer and wiring harnesses. Release "DOWN" button when finished.

6. Attach meter between terminals 1 and ~~11~~ 9 on the wiring block. Push and hold the "DOWN" button. Verify 0V AC after two seconds. If incorrect, troubleshoot T2 timer and wiring diagram. NOTE: 24V AC should be present during the initial two second time period. Release the "DOWN" button.

7. Attach meter between terminals 1 and 10 on the wiring block. Push and hold the "DOWN" button. Verify 24V AC during the first four seconds, 0V AC after four seconds. If incorrect, troubleshoot T1 and T2 timers. Release the "DOWN" button.

Reconnect motor wiring at M1 and M1 terminals on the wiring block. If problems still exist, refer to the System Wiring Diagrams, and continue troubleshooting. If the electrical connections and functions are correct in the power panel, the problem may be hydraulic. Refer to the System Hydraulic Diagrams, and continue troubleshooting.

TROUBLESHOOTING THE HYDRAULIC SYSTEM OF THE 3770/3870 LIFTS

For most problems with the lift, refer to the hydraulic system schematics included in this troubleshooting guide. There are some potential trouble areas which will be highlighted in this section, because they are more exposed to damage or blockage than other components in the system.

1. HOSE BREAK VALVES:

These valves pass all hydraulic fluid from the reservoir through the system, and into the Main hydraulic cylinders. Their function is to prevent a sudden drop of the lift (on one or both sides) should a hydraulic hose or fitting fail. This valve is composed of a valve body, a check ball, a spring, a vented port, and a retainer cap. The machined groove (see illustrations of hydraulic systems) must be mounted nearest the main hydraulic cylinder, or the lift will not raise. Should a hose break valve malfunction due to an accumulation of debris from the hydraulic oil, take the valve apart and clean the components. Reassemble the valve, install, and retry function. If the valve still will not work, replace the unit with a functional unit.

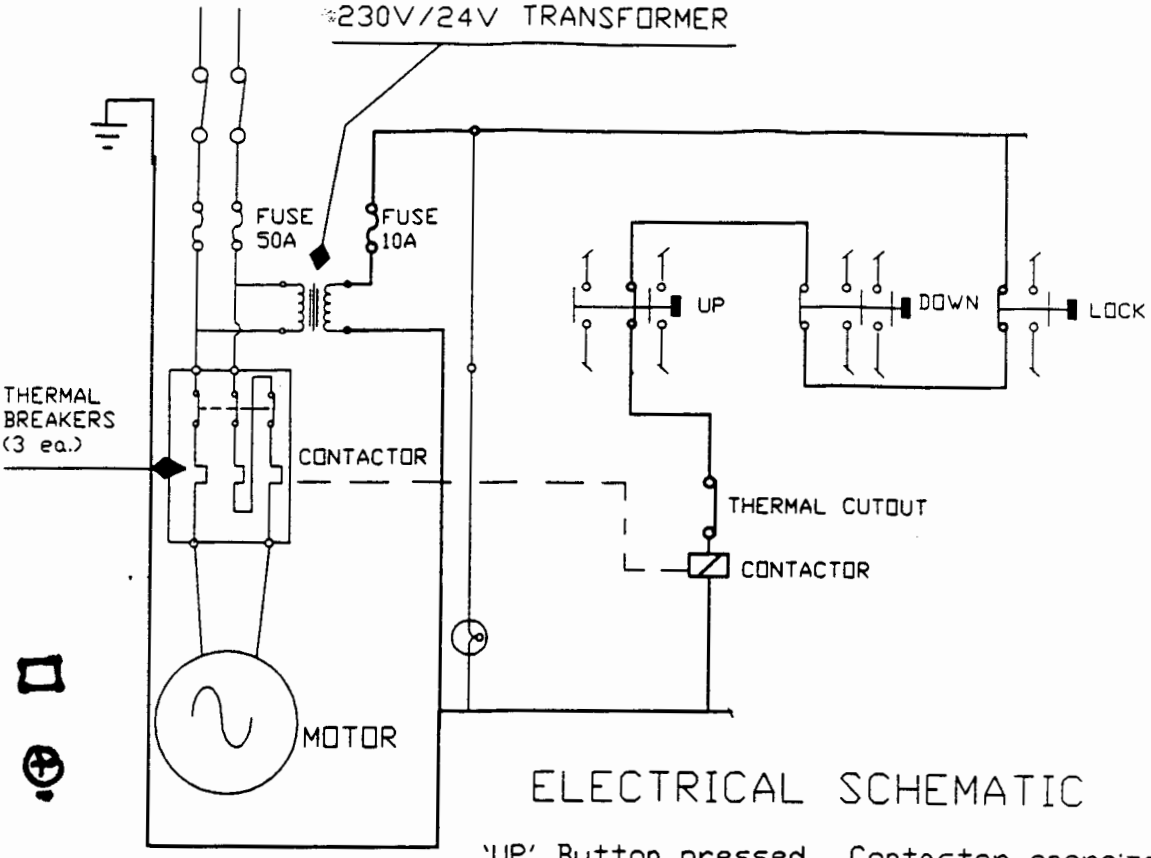
2. FLOW CONTROL VALVE

Again, all hydraulic fluid in the system passes through this valve, creating the possibility of debris accumulation in the valve. Should this valve be installed backward, the unit will not raise when the "UP" button is pressed. If the flow rate setting in the valve is incorrect, the lift may descend part way in a normal fashion, then suddenly lock on one side or both, as the velocity of the hydraulic oil leaving the cylinders reaches the reaction level of the hose break valves. In this instance, the technician may assume that the hose break valves are defective, and attempt repairs on them, when the real problem source is the Flow Control Valve. Before replacing hose break valves when this situation exists, troubleshoot the flow control valve first. It may be disassembled and cleaned; but readjustment of the valve is not recommended. If the valve is defective, and cleaning does not help, replace the valve.

If a lift is stuck in the up position, the hose break valves may be opened slightly (loosen the fittings) and the lift allowed to settle down on the locks. The valves themselves may then be removed and cleaned, then reinstalled and tested for function. In an emergency, the hose break valves may be eliminated from the system to get a lift down. **DO NOT LEAVE THE LIFT WITH THE VALVES OUT OF THE SYSTEM. THIS CREATES A HAZARDOUS CONDITION FOR THE OPERATOR OF THE MACHINE!** The Flow Control valve may be removed and serviced at the same time as the Hose Break Valves. If a Flow Control valve is suspected to be defective, the technician can bypass it by hooking the hoses direct to the pump. The unit can then be tested to verify function of the valve. **CAUTION: IF A VEHICLE IS ON THE LIFT, REMOVING THE FLOW CONTROL VALVE WILL ALLOW THE LIFT TO DESCEND RAPIDLY. DO NOT ATTEMPT TO OPERATE THE LIFT WITH THE FLOW CONTROL VALVE REMOVED, EXCEPT AS A TEST!**

The FMC TRAINING CENTER would like to acknowledge the contributions of Henning Jorgensen, FSS, Ca.; Art Timm, Training; Dennis Knox, Technical Assist; and Carrol Shepherd, Service Training; for their aid in bringing this guide to the FMC Service Personnel.

FIG. 2



ELECTRICAL SCHEMATIC

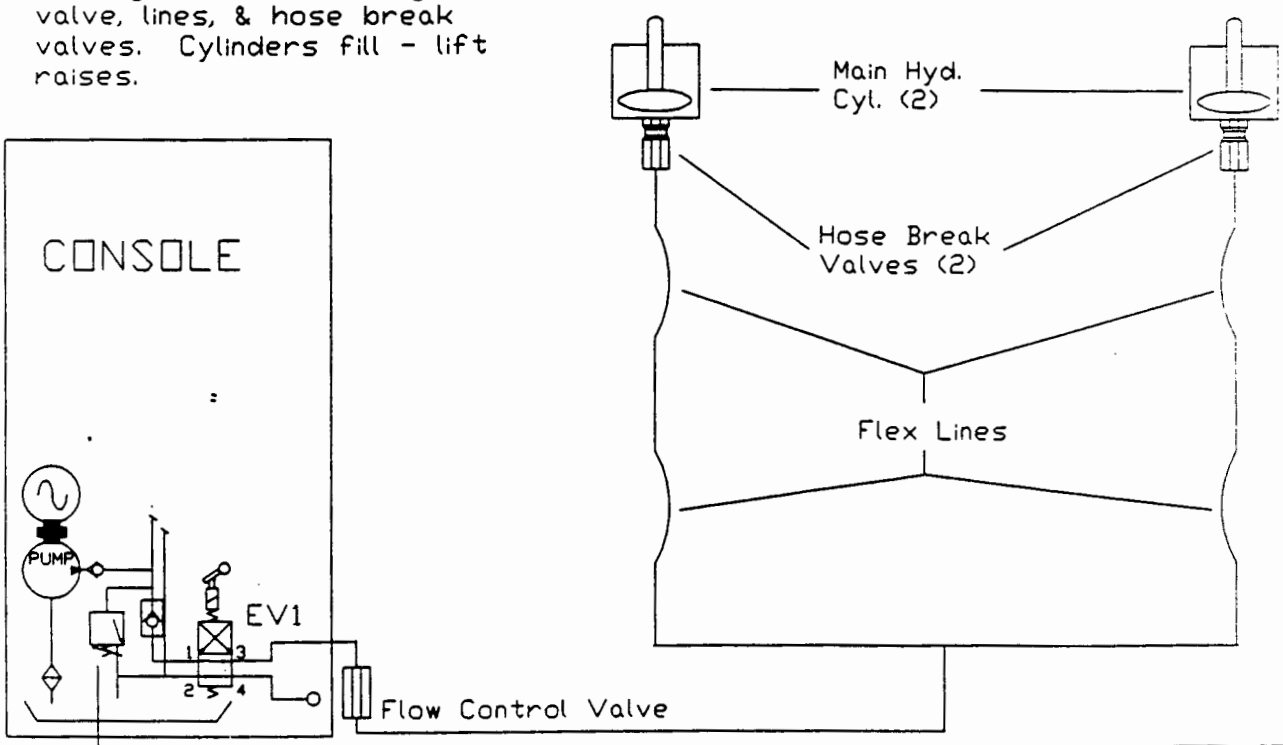
'UP' Button pressed. Contactor energized. Motor runs and raises lift.

3770ELUP

FIG. 2A

HYDRAULIC DIAGRAM - 'UP' CYCLE

Motor runs, hydraulic fluid flows through EV1 (not energized), flow control valve, lines, & hose break valves. Cylinders fill - lift raises.



2. CRITICAL COMPONENTS; "UP" CYCLE:

A. ELECTRICAL

1. Switch - ON/OFF
2. 50A fuses
3. Transformer
4. 10A fuse
5. Bottom contacts of "LOCK" and "DOWN" buttons
6. Middle contacts of "UP" button.
7. Contactor
8. Thermal cutouts on contactor (3)
9. Motor
10. Wiring

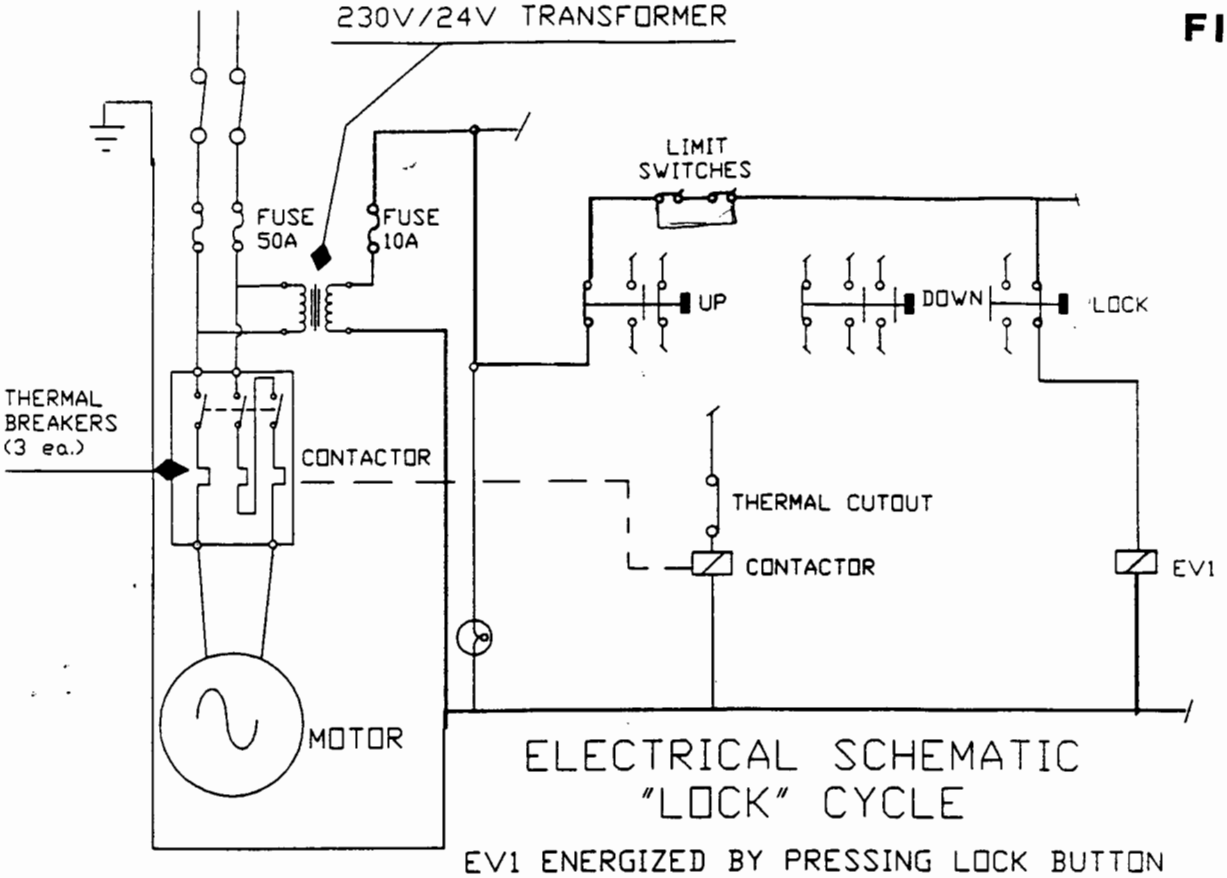
B. HYDRAULIC

1. Flexible coupling
2. Pump
3. Pressure Relief Valve (internal)
4. Check valve (internal)
5. Flow Control Valve
6. Hydraulic lines
7. Hose break valves.
8. Main hydraulic cylinders.

"UP" CYCLE SUMMARY

Realize that if any of these items are defective, the lift will not raise. Troubleshooting the "UP" cycle should be concerned with only these items. No other portions of the lift are involved in this portion of the cycle.

FIG. 3



ELECTRICAL SCHEMATIC "LOCK" CYCLE

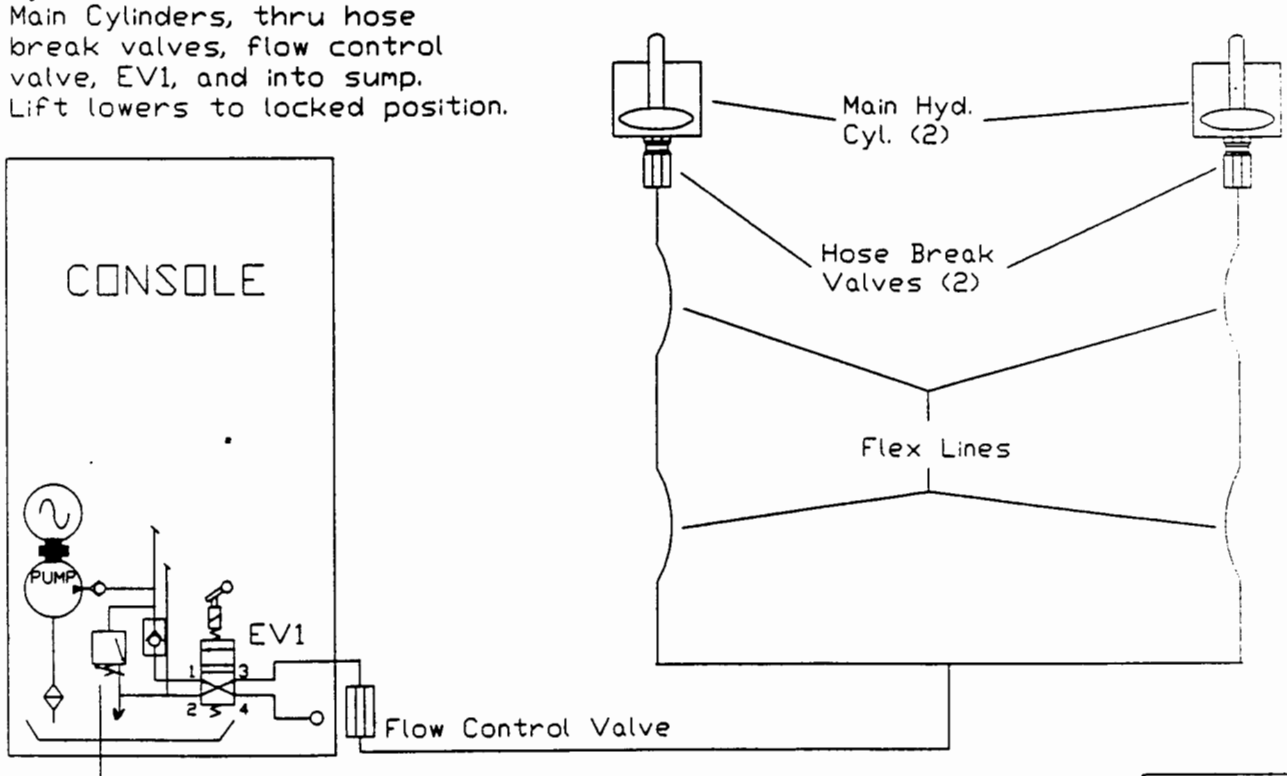
EV1 ENERGIZED BY PRESSING LOCK BUTTON
FLUID DRAINS FROM MAIN HYDRAULIC CYLINDERS AND LOWERS LIFT TO LOCKED POSITION.

3770LOCK

HYDRAULIC SCHEMATIC - MECHANICAL LOCK ACTION

FIG. 3A

'LOCK' Button pressed. EV1 energized. Hydraulic fluid flows out of Main Cylinders, thru hose break valves, flow control valve, EV1, and into sump. Lift lowers to locked position.



3770HYDR

SEQUENTIAL OPERATION STEP - 3770/3870 LIFTS

LOCK CYCLE OPERATION (Fig. 3, 3A)

1. Push the "LOCK" button

   A. EV1 is powered (24V)

   B. Mechanical valve associated with EV1 opens. Oil from the Main hydraulic cylinders flows from the cylinders back into the reservoir.

   C. Unit lowers to locked position on the safety locks.

2. CRITICAL COMPONENTS; "LOCK" CYCLE:

   A. ELECTRICAL

      1. Switch - ON/OFF
      2. 50A fuses
      3. Transformer
      4. 10A fuse
      5. Bottom contacts of "UP" button
      6. Limit Switches
      7. Upper contacts of "LOCK" button
      8. EV1 coil
      9. Wiring harnesses

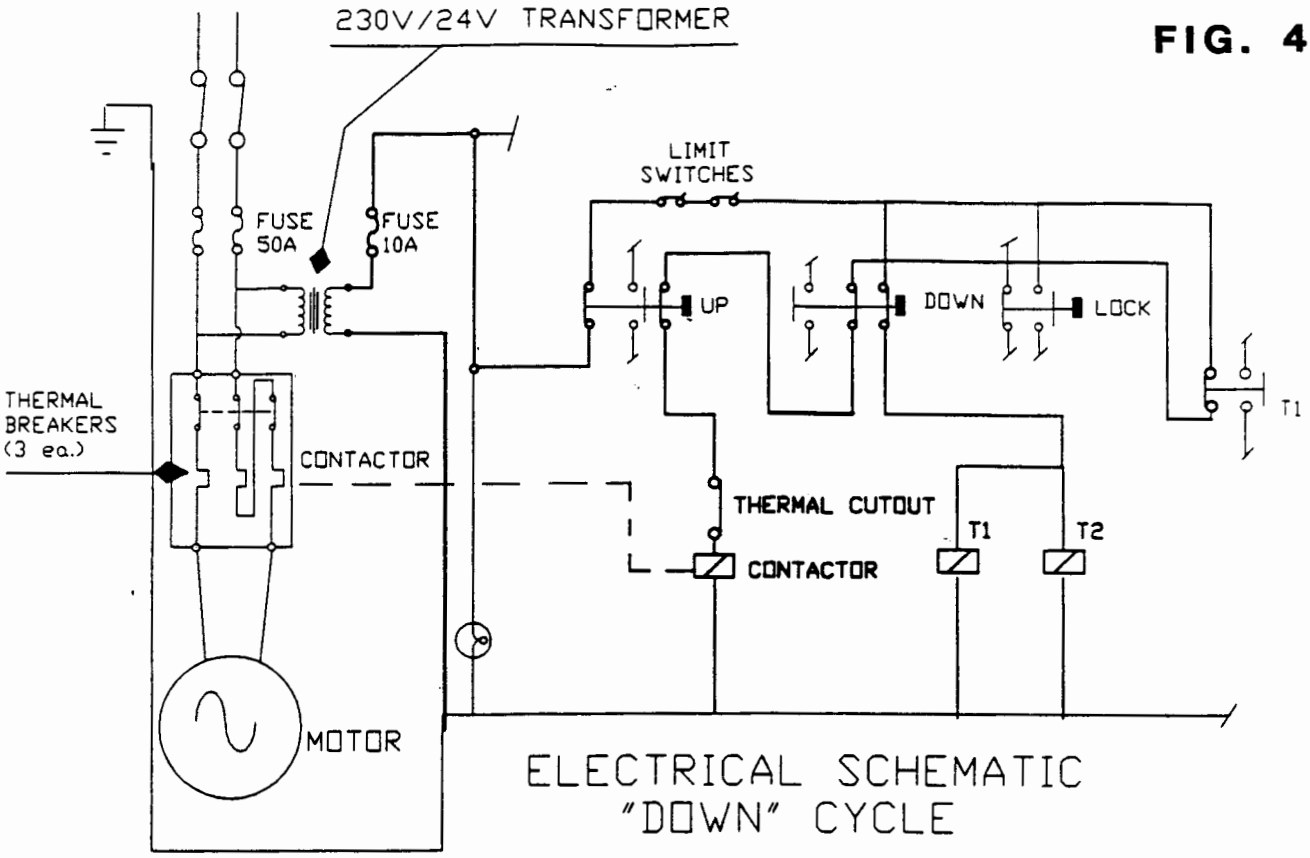
B. HYDRAULIC

1. EV1.
2. Flow control valve.
3. Hydraulic lines.
4. Hose Break Valves
5. Main hydraulic cylinders.

"LOCK" CYCLE SUMMARY

Note that if a defect exists in any of the above components, the mechanical lock system will not function properly, if at all. Limit switch continuity may be checked by jumping pins 7 and 9 of the wiring block in the upper left hand side of the console. No other portions of the lift electrical or hydraulic systems are involved in this portion of the lift cycle.

FIG. 4



ELECTRICAL SCHEMATIC
"DOWN" CYCLE

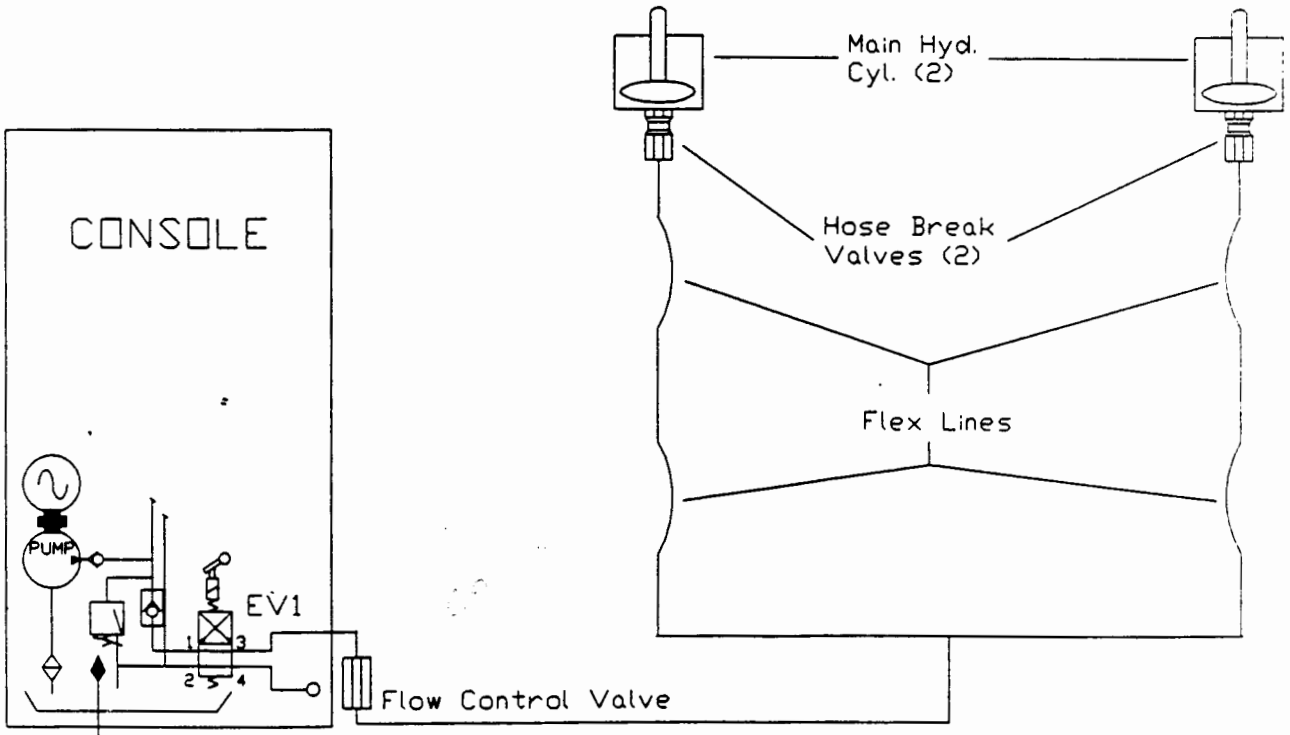
MOTOR RUNS - LIFT RAISES OFF LOCKS

3770DN1

FIG. 4A

HYDRAULIC SCHEMATIC - DOWN CYCLE

'Down' Button pushed
Lift is raising off of locks



3770HDN1

SEQUENTIAL OPERATION STEP - 3770/3870 LIFTS

DOWN CYCLE

1. PRESS "DOWN" BUTTON (Reference Fig. 4, 4A)

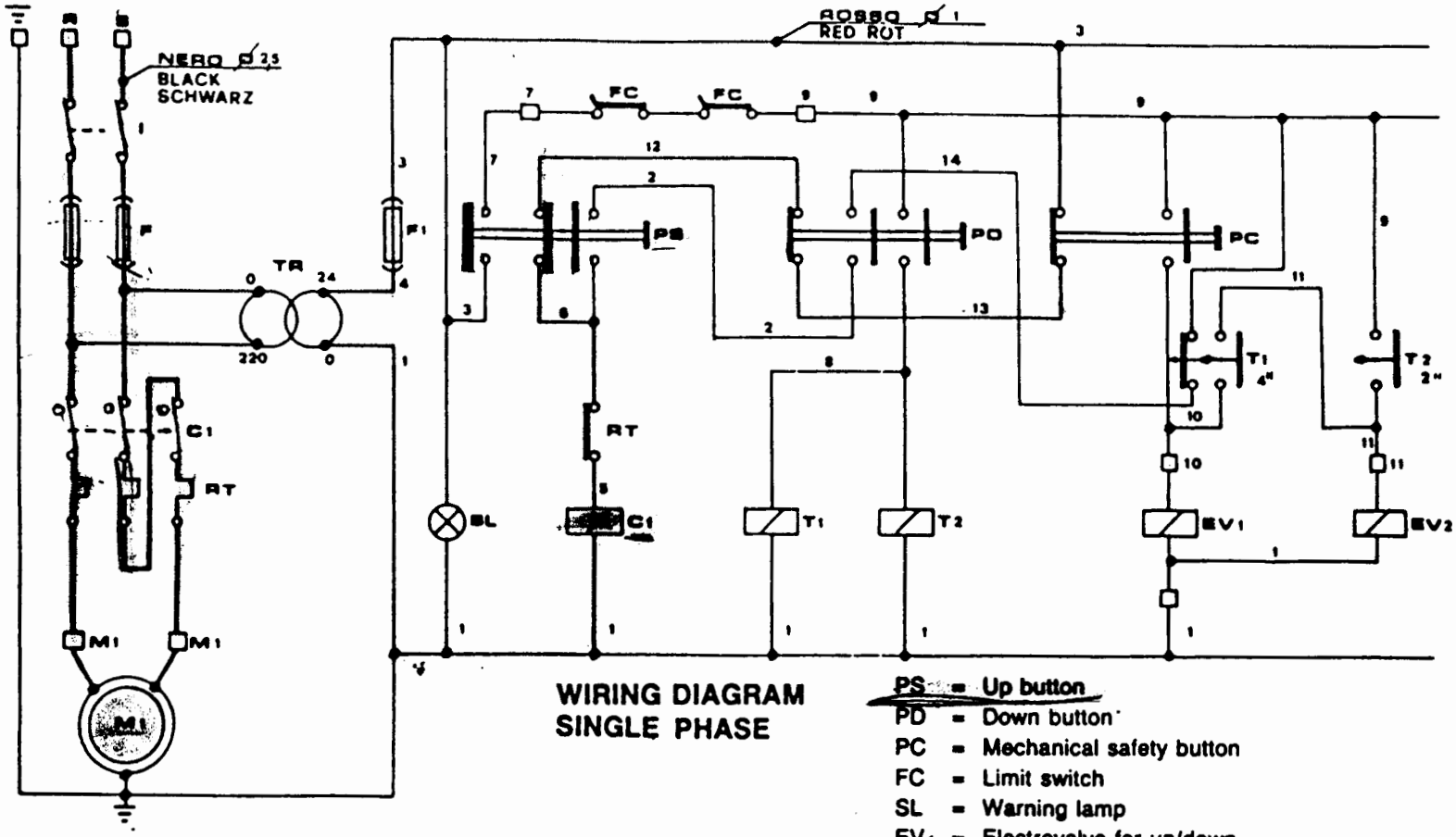
   A. Contactor closes, motor runs, lift raises.

   B. Power is supplied to Timers (2 and 4 second)

   C. T2 timer closes circuit after 2 seconds. EV2 opens, filling lock cylinders with oil, pushing the lock plates out of engagement with the main hydraulic cylinders. The motor stops raising the lift while the lock release cylinders fill, then starts raising the lift again after the lock release cylinders are filled and the lock plates retracted.

   D. T1 timer closes circuit after 4 seconds, opening EV1. The motor stops and oil flows through hose break valves, hydraulic lines, flow control valve, and EV1, back into the hydraulic oil reservoir. Lift descends to the floor (or until the "DOWN" button is released).

ELECTRICAL DIAGRAM

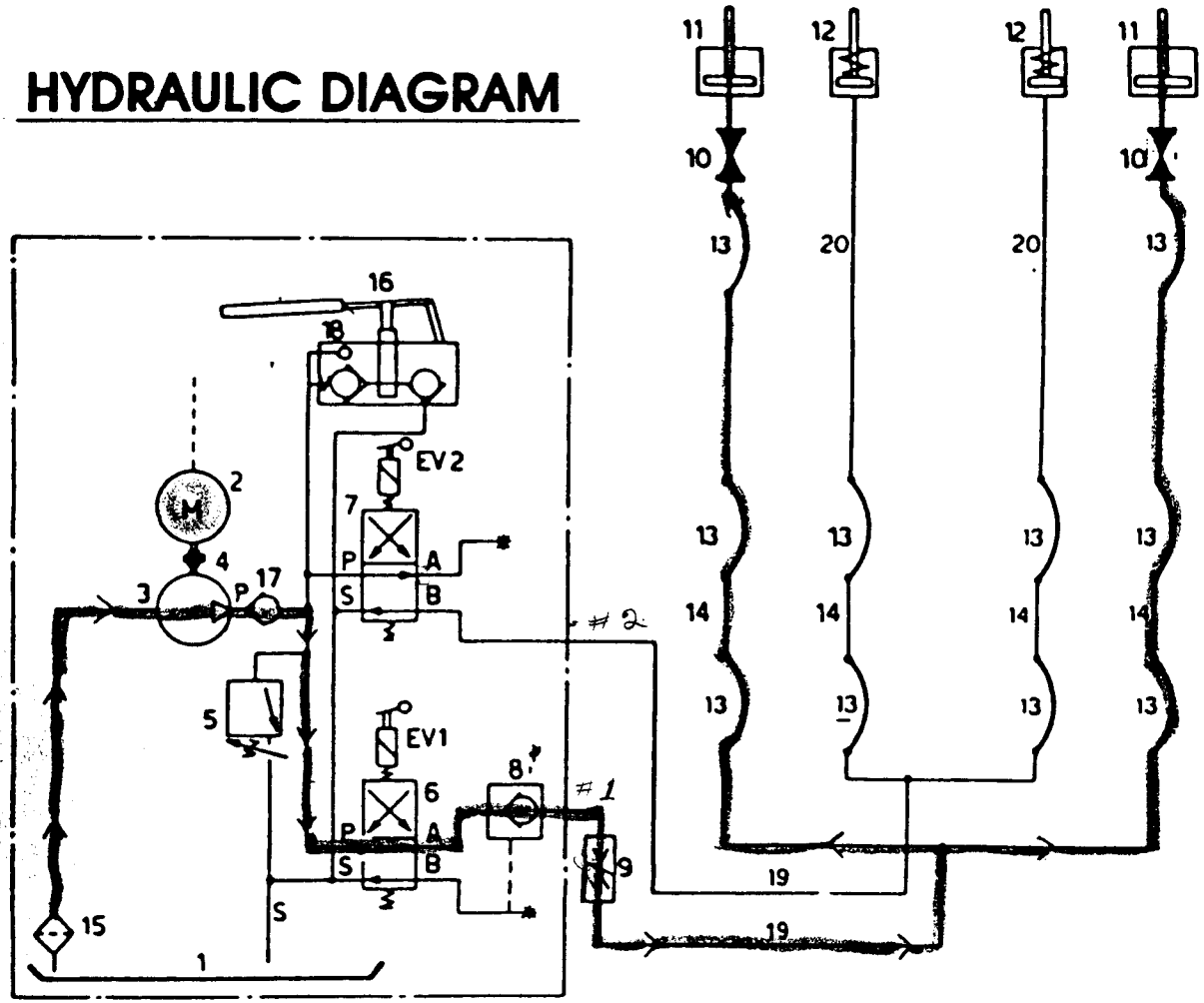


WIRING DIAGRAM
SINGLE PHASE

9	7	11	10	1	M1	M1	⏚	S	R	⏚
FINE CORSA LIMIT SWITCH ENDSCHALTER		ELETTROVALVOLE ELECTROVALVES ELEKTROVENTILE			MOTORE MOTOR MOTOR			LINEA MONOFASE MAINS STROM		

PS = Up button
PD = Down button
PC = Mechanical safety button
FC = Limit switch
SL = Warning lamp
EV_1 = Electrovalve for up/down
EV_2 = Electrovalve for mechanical locks
C_1 = Contactor
RT = Thermal cutout
M_1 = Electric motor
TR = Transformer 120 VA
I = Switch
F = Fuses 35 amp.
F_1 = Fuses 10 amp.
T_1 = Timer for EV1
T_2 = Timer for EV2
□ = From the terminal board

HYDRAULIC DIAGRAM

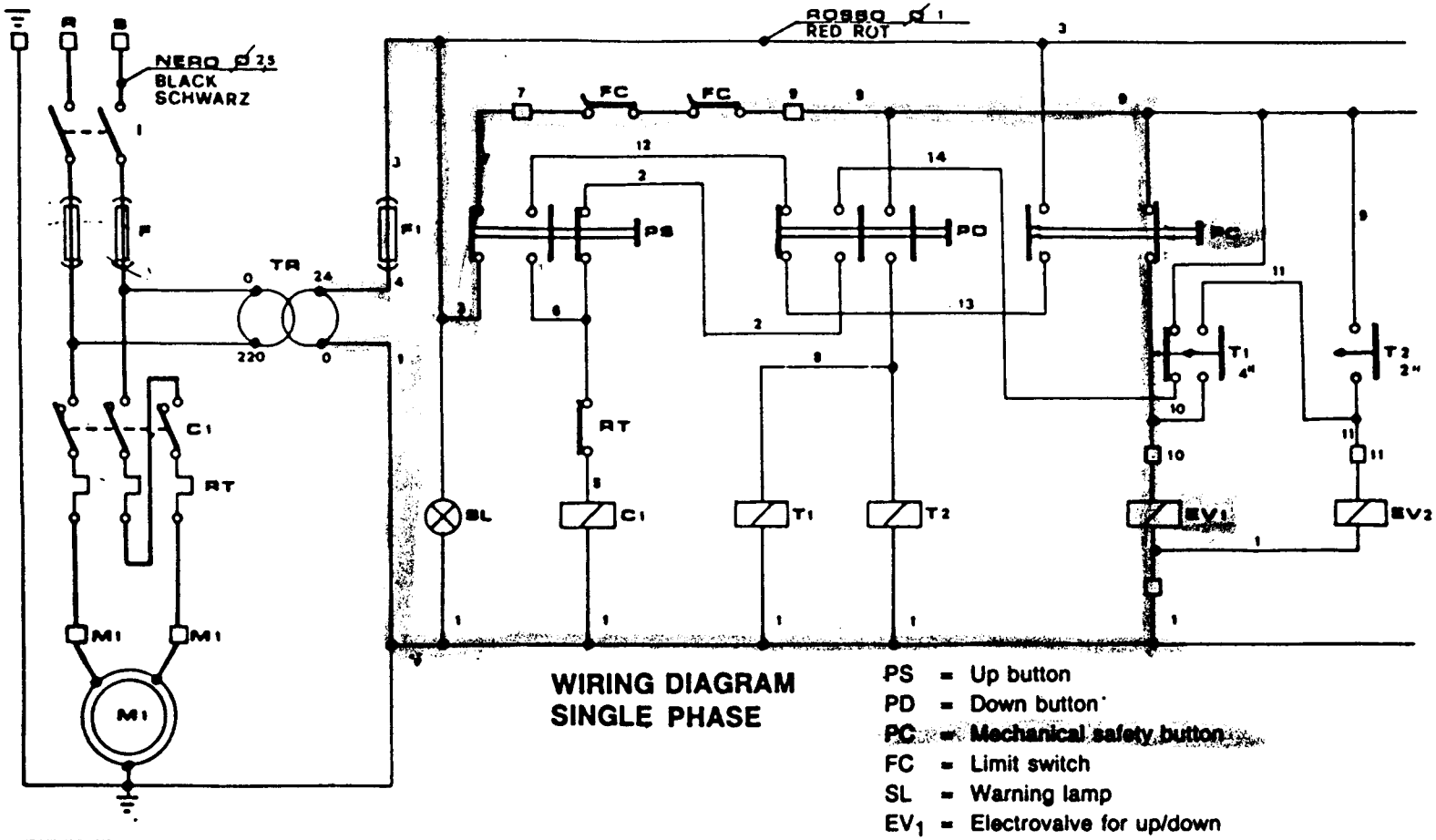


HYDRAULIC DIAGRAM

1. Oil tank
2. Electric motor
3. Gear pump
4. Motor-pump coupling
5. Pressure control valve
6. Interlocked directional valve with one-solenoid electric control and lever
7. Interlocked directional valve with one-solenoid electric control and lever
8. Hydraulic check valve
9. Flow regulating valve (for down movement)
10. Flow stopping valve (for down movement)
11. Single-acting lifting cylinder
12. Single acting cylinder for mechanical safety locks
13. Flexible tube R2 Ø 3/8"
14. Steel pipe Ø 12 x 1,5 mm
15. Oil suction filter
16. Hand pump
17. Non-return valve
18. 1/4" gas-type connection for pressure gauge
19. Steel pipe Ø 12 x 1,5 mm
20. Steel pipe Ø 8 x 1 mm

Sq 'y Locks 1

ELECTRICAL DIAGRAM



WIRING DIAGRAM
SINGLE PHASE

9	7	11	10	1	M1	M1	S	R
FINE CORSA LIMIT SWITCH ENDSCHALTER		ELETTROVALVOLE ELECTROVALVES ELEKTROVENTILE			MOTORE MOTOR MOTOR		LINEA MONOFASE MAINS STROM	

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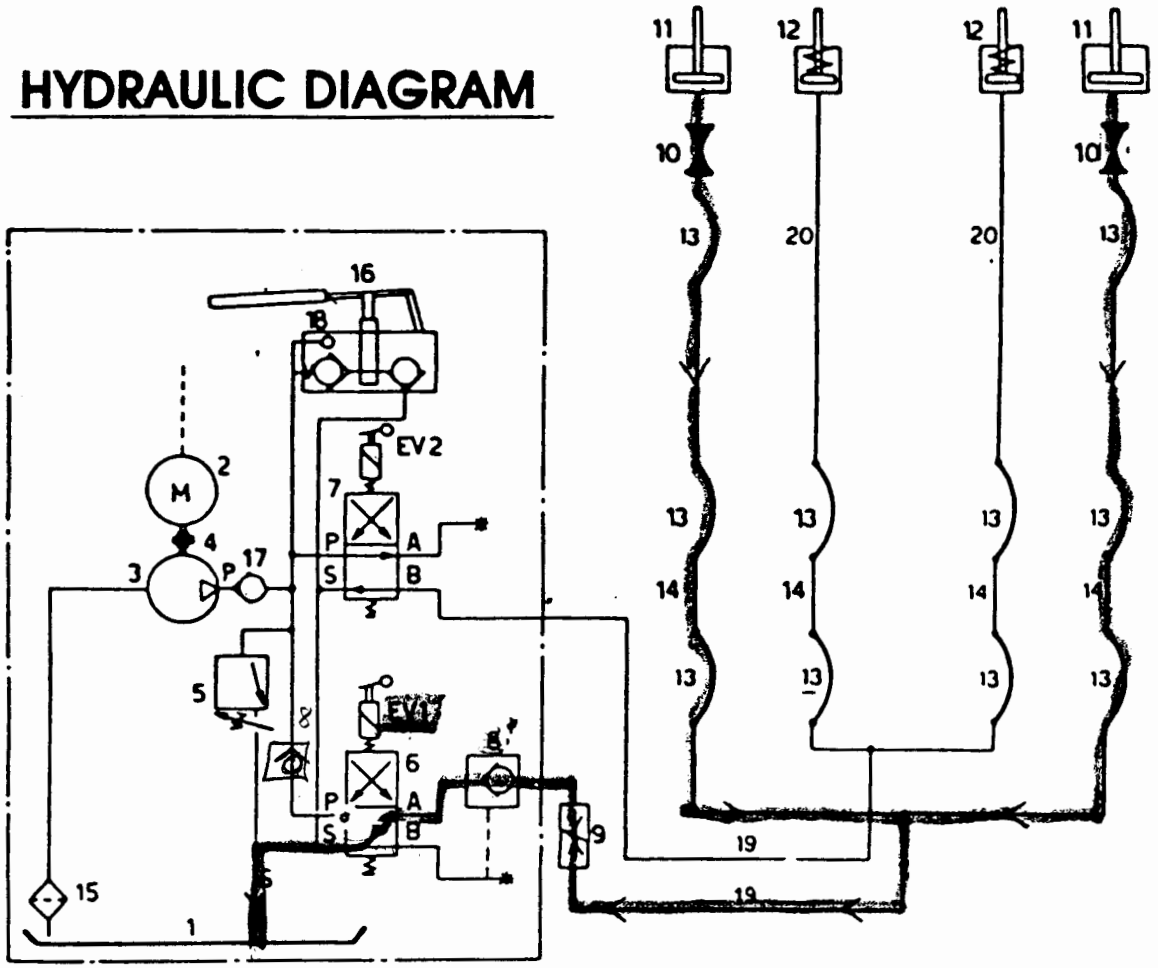
HYDRAULIC DIAGRAM



HYDRAULIC DIAGRAM

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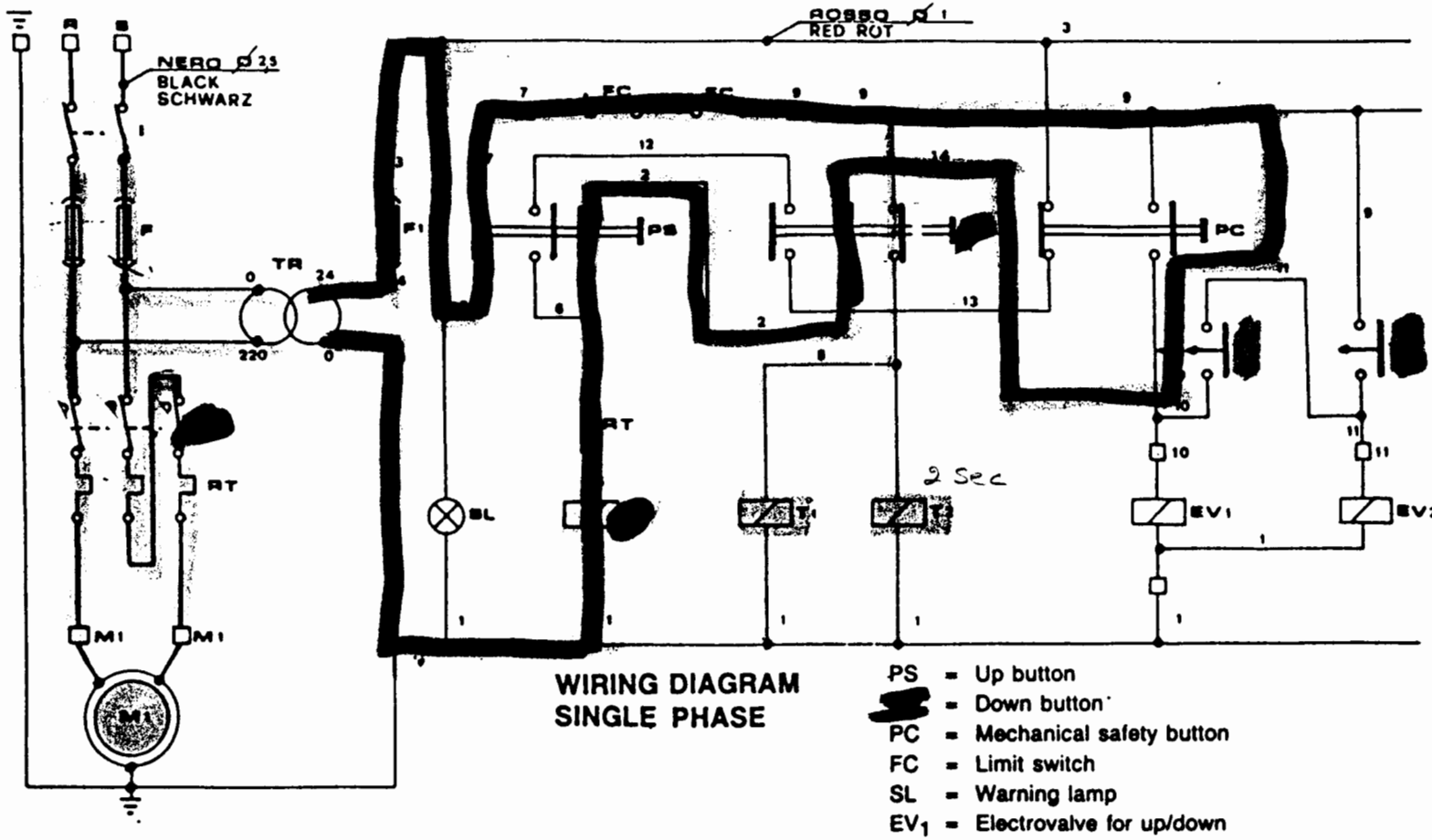
15. Oil suction filter
16. Hand pump
17. Non-return valve
18. 1/4" gas-type connection for pressure gauge
19. Steel pipe Ø 12 x 1,5 mm
20. Steel pipe Ø 8 x 1 mm

(DOWN 1 raises up 1ST Thereafter 2second (NEXT DOWN ING-)

ELECTRICAL DIAGRAM



WIRING DIAGRAM SINGLE PHASE

	9	7	11	10	1	M1	M1		S	R
FINE CORSA LIMIT SWITCH ENDSCHALTER			ELETTROVALVOLE ELECTROVALVES ELEKTROVENTILE			MOTORE MOTOR MOTOR			LINEA MONOFASE MAINS STROM	

- PS = Up button
- [redacted] = Down button
- PC = Mechanical safety button
- FC = Limit switch
- SL = Warning lamp
- EV_1 = Electrovalve for up/down
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- C_1 = Contactor
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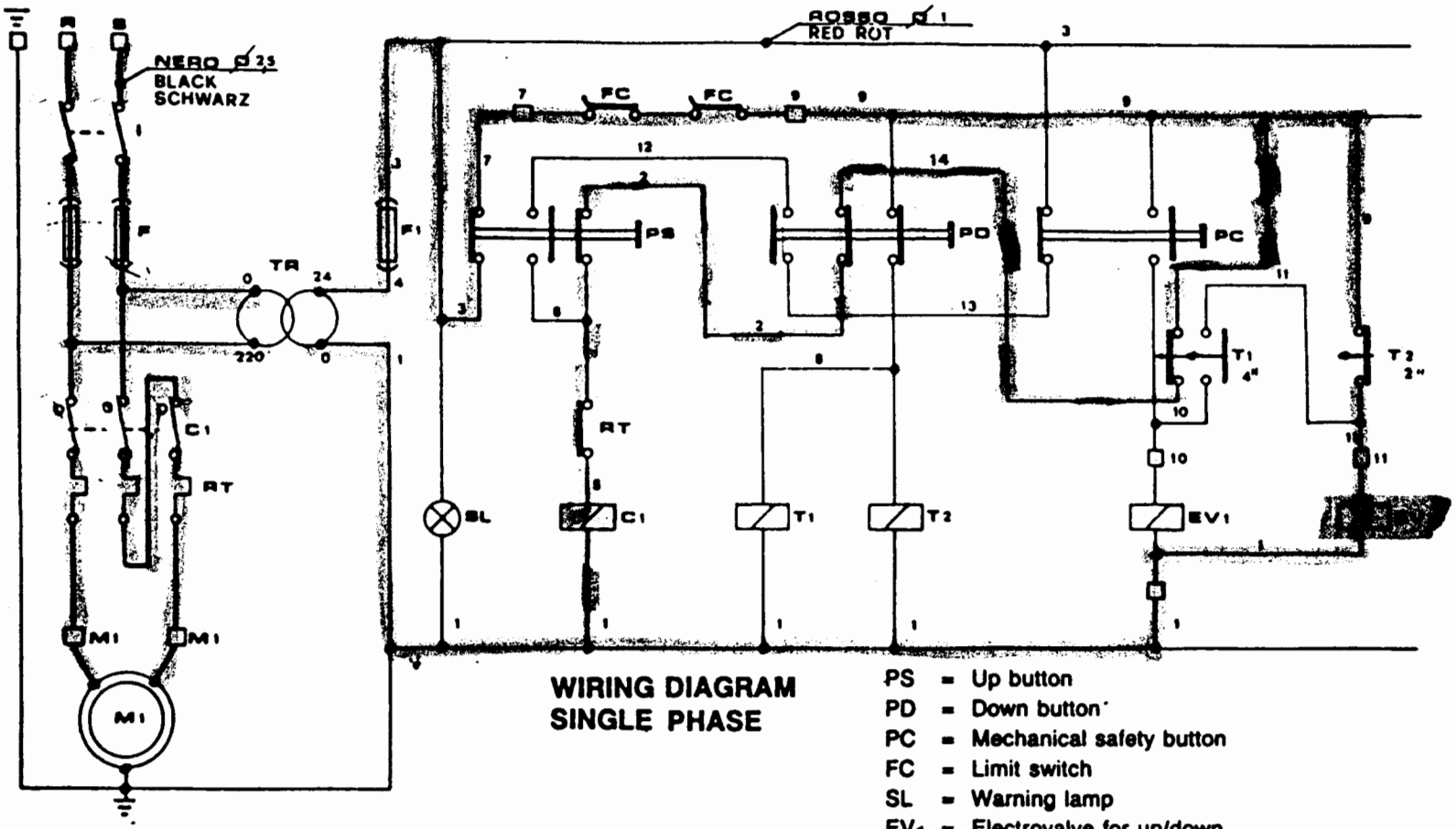
- T_1 = Timer for EV1
- T_2 = Timer for EV2
- □ = From the terminal board

Day : after 2 sec.

ELECTRICAL DIAGRAM



WIRING DIAGRAM
SINGLE PHASE

9	7	11	10	1	M1	M1		S	R	
FINE CORSA LIMIT SWITCH ENDSCHALTER		ELETTROVALVOLE ELECTROVALVES ELEKTROVENTILE			MOTORE MOTOR MOTOR			LINEA MONOFASE MAINS STROM		

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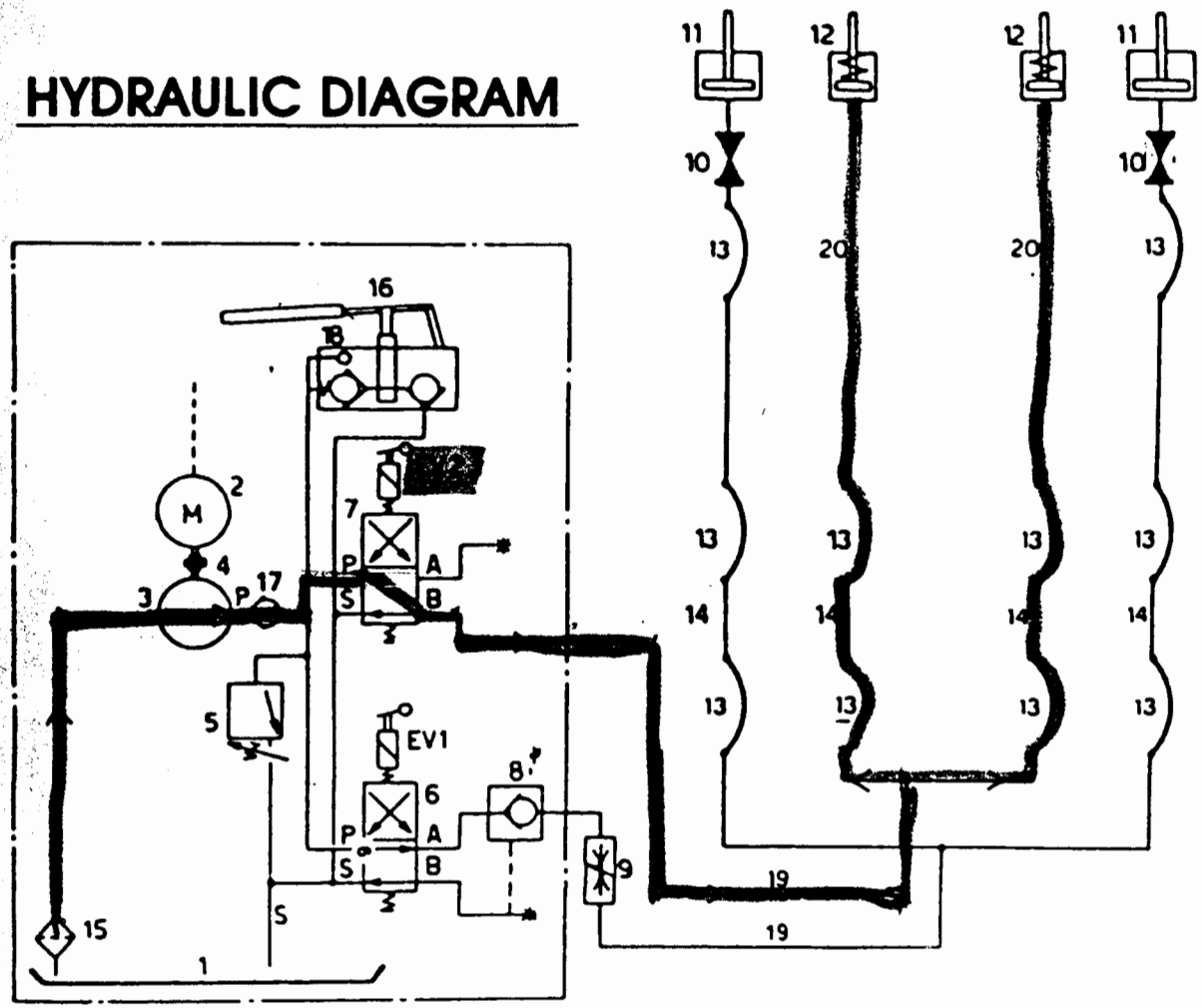
F_1 = Fuses 10 amp.
T_1 = Timer for EV1
T_2 = Timer for EV2
□ = From the terminal board

(Down after 2 sec.

HYDRAULIC DIAGRAM



HYDRAULIC DIAGRAM

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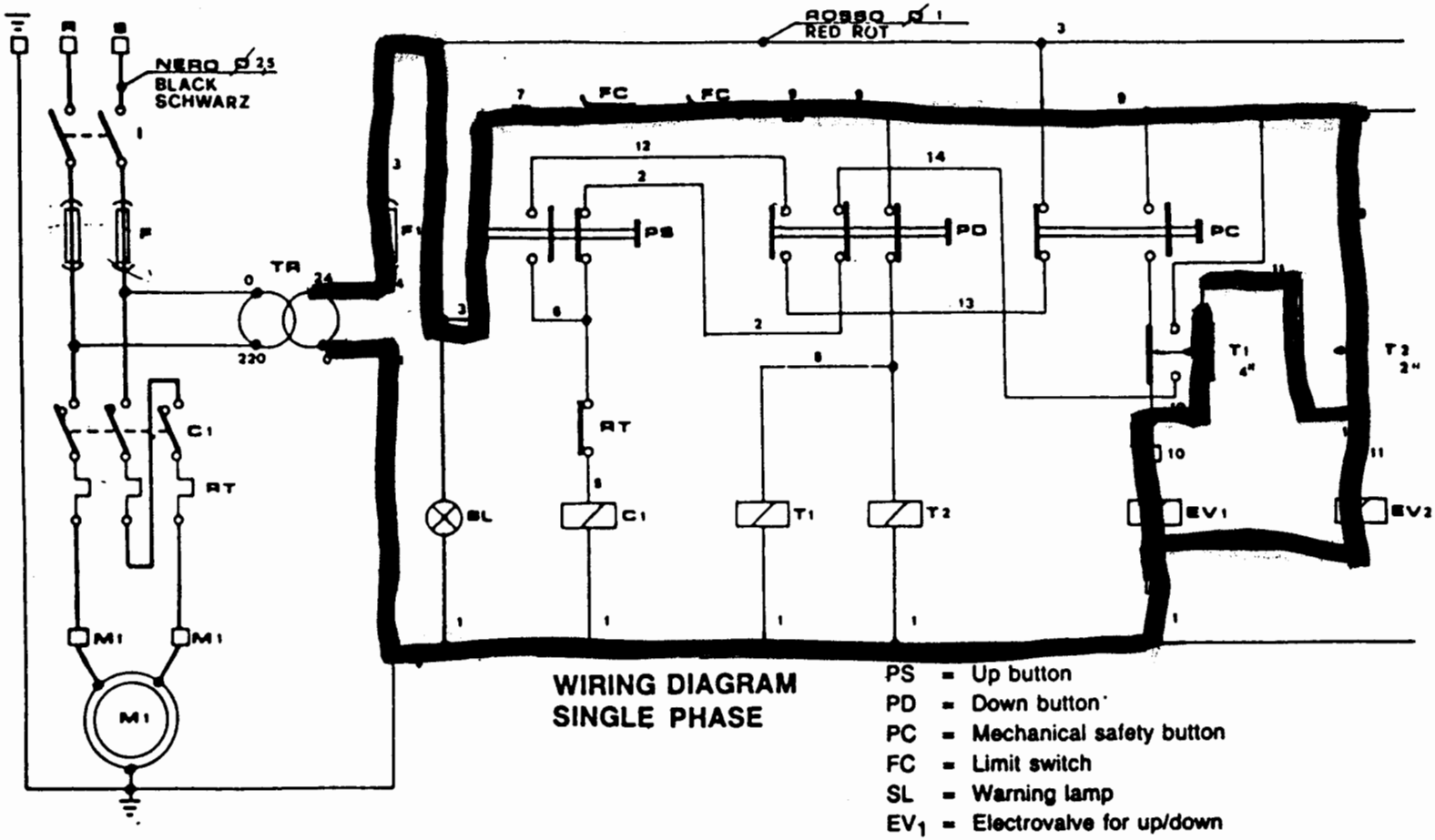
15. Oil suction filter
16. Hand pump
17. Non-return valve
18. 1/4" gas-type connection for pressure gauge
19. Steel pipe Ø 12 x 1,5 mm
20. Steel pipe Ø 8 x 1 mm

Do(n after 4 sec

ELECTRICAL DIAGRAM



WIRING DIAGRAM
SINGLE PHASE

9	7	11	10	1	M1	M1		S	R	
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- TR = Transformer 120 VA
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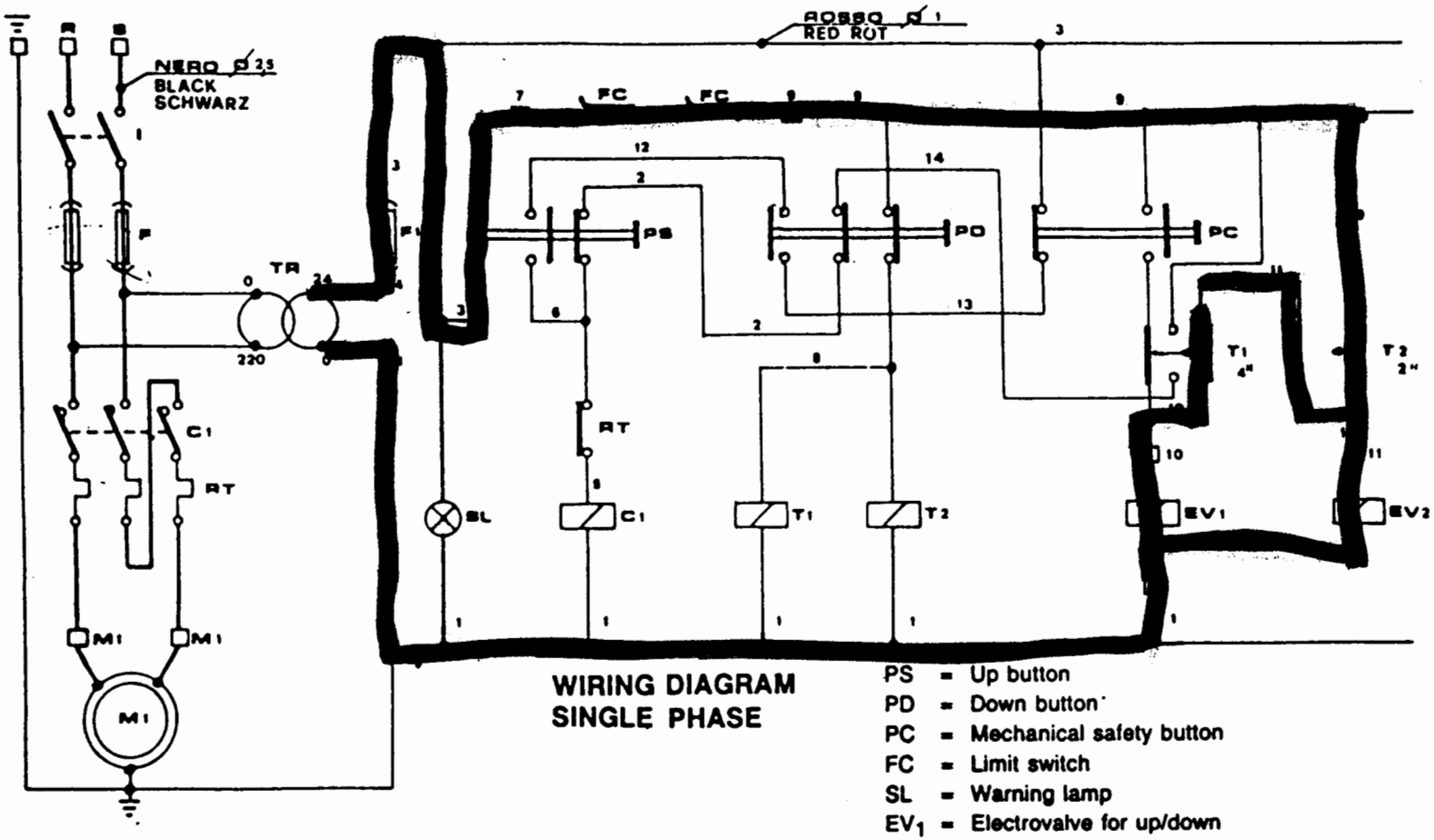
- □ = From the terminal board

Do(n after 4 see

ELECTRICAL DIAGRAM



WIRING DIAGRAM
SINGLE PHASE

	9	7	11	10	1	M1	M1	S	R
	FINE CORSA LIMIT SWITCH ENDSCHALTER		ELETTROVALVOLE ELECTROVALVES ELEKTROVENTILE			MOTORE MOTOR MOTOR		LINEA MONOFASE MAINS STROM	

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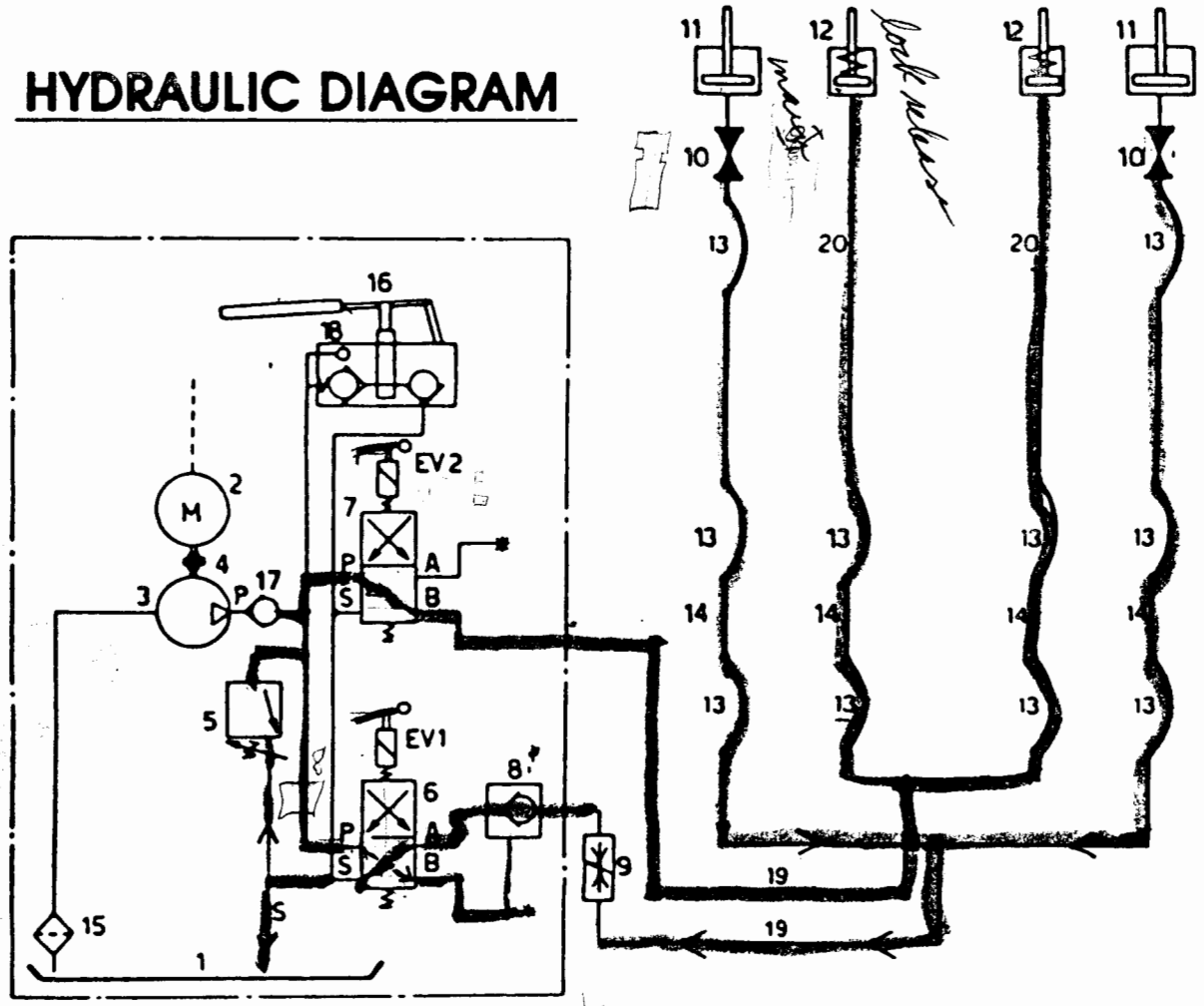

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