VSD Display Messages

"105% MOTOR CURRENT OVERLOAD" - This shutdown is generated by the VSD logic board, and it indicates that a motor overload has occurred. The shutdown is generated when the VSD logic board has detected that at least one of the three output phase currents has exceeded 105% of the programmed 100% job full load amps (FLA) value for more than 7 seconds. The 100% job FLA setpoint is determined by adjustment of the FLA trimpot on the VSD logic board. The 100% job FLA setpoint may be viewed by pressing the "Options" key. This shutdown requires a manual reset via the "Reset" push-button on the VSD logic board.

"BUS OVER-VOLTAGE FAULT" - The VSD's DC link voltage is continuously monitored; and, if the level exceeds 745 VDC, a bus over-voltage shutdown is initiated. If this shutdown occurs, it will be necessary to look at the level of the 460 VAC applied to the drive. The specified voltage range is 414 to 508. If the incoming voltage is in excess of 508, steps should be taken to reduce the voltage within the specified limits.

"BUS VOLTAGE IMBALANCE FAULT" - The DC link is filtered by many large, electrolytic capacitors which are rated for 450 VDC. These capacitors are wired in series to achieve a 900 VDC capability for the DC link. It is important that the voltage be shared equally from the junction of the center or series capacitor connection to the negative bus and to the positive bus. This center point should be approximately ½ of the total DC link voltage. Verify the problem truly exists using a pair of digital meters, measuring from the series capacitor connection point to the positive bus and from the series capacitor connection point to the negative bus. When the precharge relay engages, both voltage readings should come up together, and be approximately equal. If you find the voltages are equal, you likely have a problem with the bus isolator board, the VSD logic board, or the wiring/connectors between them. Check the voltages at the input to the VSD Logic board, J3 pin 1 to J3 pin 2 and J3 pin 2 to J3 pin 3. The voltages should be approximately equal. If they are not, the likely cause is a bad isolator board, or a loose connection. If they are balanced, the VSD logic board should be replaced.

Most actual bus voltage imbalance conditions are caused by a shorted capacitor or a leaky or shorted IGBT transistor in an output phase bank assembly. In order to check for these conditions, the laminated bus structure connecting the output phase banks together must be removed. Then connect a 12 VDC source (such as a battery charger used to charge automobile batteries) and apply 12 VDC between the positive bus and negative bus plates on each output pole assembly while measuring the voltage from center to plus and center to minus. The bank which is causing the imbalance will be evident via unequal voltage readings. Replace the appropriate output phase bank assembly.

"FILTER DCCT 1 ERROR" or "FILTER DCCT 2 ERROR" - During initialization, with no current flowing through the DCCTs, the DCCT output voltages are measured and compared with a preset limit via the filter logic board. If the measured values exceed the preset limits, the DCCTs are presumed to be bad, and this shutdown will be generated. If this shutdown should occur, check the signal output from the DCCTs by measuring the voltage at filter logic board plug J3 pin 5 and J3 pin 12 with respect to signal ground (J5 pin 2) with the unit stopped. Both voltages should be approximately 0 VDC. These DCCTs are powered from $\pm$15 VDC supplies via the filter logic board. Check for the presence of the +15 VDC power supplies by measuring the voltages at filter logic board J3 pins 6 and 10 with respect to signal ground (J5 pin 2). Check for the presence of the -15 VDC power supplies by measuring the voltages at filter logic board J3 pins 7 and 11 with respect to signal ground (J5 pin 2). If the DCCT output is not zero and the $\pm$ 15 volt supplies are present, replace the offending DCCT. If no problem with the DCCT output voltage is found, replace the filter logic board.

"FLTR BUS OVER-VOLTAGE FLT" - The harmonic filter's DC link voltage is continuously monitored; and if the level exceeds 860 VDC, a Filter Bus Over-Voltage shutdown is initiated. Keep in mind that the harmonic filter has its own DC bus as part of the filter power assembly, and this DC Link is not connected in any way with the drive's DC link and laminated bus. If this shutdown occurs, it will be necessary to look at the level of the 460 VAC applied to the drive. The specified voltage range is 414 to 508. If the incoming voltage is in excess of 508, steps should be taken to reduce the voltage within the specified limits. The cause of this message will typically be high line voltage or a surge on the utility supply.

"FLTR BUS V IMBALANCE FLT" - The filter DC link is filtered by large, electrolytic capacitors which are rated for 450 VDC. These capacitors are wired in series to achieve a 900 VDC capability for the DC link. It is important that the voltage be shared equally from the junction of the center or series capacitor connection to the negative bus and to the positive bus. This center point should be approximately ½ of the total DC link voltage. Verify the problem truly exists using a pair of digital meters, measuring from the series capacitor connection point (wire 530A) to the positive bus (wire 531A) and from the series capacitor connection point to the negative bus (wire 529A). When the filter precharge relay engages, both voltage readings should come up together and be approximately equal. If you find the voltages are equal, you likely have a problem with the filter bus isolator board, the filter logic board, or the wiring/connectors between them. Check the voltages at the input to the filter logic board, J5 pin 4 to J5 pin 5 and J5 pin 5 to J5 pin 6. The voltages should be approximately equal. If they are not, the likely cause is a bad isolator board or a loose connection. If they are balanced, the filter logic board should be replaced. If the voltages do not come up equally, check the wiring between the bleeder resistors 14RES and 15RES and the filter phase assembly. Also check the value of these resistors. They should be 3000 ohms nominally. If no problem can be found by performing these steps, replace the filter phase assembly.

"FLTR HEATSINK OVERTEMP FLT" - The ‘519’ filter power assembly has one heatsink thermistor on the 351 and 503 HP units, and two heatsink thermistors on the 790 HP units. If the temperature on any heatsink exceeds 167° F, the unit will shut down, and require a manual reset by pressing the "Overtemp Reset" push button located on the filter logic board. This message is usually an indication that the level of coolant in the closed loop system on the back of the VSD is low. If the coolant level is found to be adequate, using an ohmeter, check the resistance of the thermistor at plug P6 (and P13 for the 790/658 Hp) on the filter logic board. The thermistor resistance should be 10K ohms at 77° F. A resistance vs. probe temperature chart is shown below.

Temperature (Degrees Fahrenheit)	Resistance
32	Infinite
50	19.9K
59	15.7K
77	10K
100	5.8K
115	4.2K
140	2.5K

"FLTR HIGH TDD FLT" - This shutdown indicates that the filter is not operating correctly, and the input current to the VSD/filter system is not sinusoidal. This shutdown will occur if the TDD exceeds 25% continuously for 45 seconds. TDD is an acronym for Total Demand Distortion, a term defined by the IEEE Std 519-1992 standard as "the total root - sum - square harmonic current distortion, in percent of the

maximum demand load current (15 or 30 min demand)". In the filter option supplied by York, the displayed TDD is the total RMS value of all the harmonic current supplied by the power mains to the VSD system divided by the job FLA of the VSD, in percent. The harmonic filter option was designed to provide an input current TDD level of 8% or less for the VSD system. A standard VSD less the optional filter typically has an input current TDD level on the order of 28 - 30%. Causes for this shutdown are numerous, but it would most likely be caused by a bad filter logic board.

"FLTR LOW BUS VOLTAGE FLT" - The harmonic filter dynamically generates its own filter DC link voltage by switching its IGBTs. This DC level is actually higher than the level one could obtain by simply rectifying the input line voltage. Thus, the harmonic filter actually performs a voltage "boost" function. This is necessary in order to permit current to flow into the power line from the filter when the input line is at its peak level. This particular shutdown and its accompanying message are generated if the filter's DC link voltage drops to a level less than 60 VDC below the filter DC link voltage setpoint. The filter DC link voltage setpoint is determined by the filter logic board via the sensing of the three phase input line to line voltage. This setpoint is set to the peak of the sensed input line to line voltage plus 32 volts, not to exceed 760 volts and varies with the input line to line voltage. If this shutdown occurs occasionally, the likely cause is a severe sag in the input line voltage. A power monitor should be installed to determine if a power problem exists.

"FLTR OVERLOAD FLT" - The three phases of RMS filter current are monitored; and if the level of any one of the three phases continuously exceeds a given threshold for seven seconds, unit shutdown is initiated, and this message is displayed. The maximum permissible continuous RMS current ratings for the harmonic filters are as follows:

351/292 HP = 128 Amps
503/419 HP = 176 Amps
790/658 HP = 277 Amps

"FLTR PCHARGE HI BUS V FLT" - During precharge, the filter's DC link must reach at least 525 VDC (425 VDC for 50 HZ) 5 seconds after the filter precharge relay is energized. The unit is shutdown, and this message is generated if this condition is not met. If this shutdown occurs, check the filter precharge relay, filter precharge resistors, and the wiring between the filter logic board and the filter precharge relay.

"FLTR PCHARGE LOW BUS V FLT" - During precharge, the filter's DC link must be equal to or greater than 50 VDC (41 VDC for 50 HZ) 1/10 second after the filter precharge relay is energized. The unit is shutdown, and this message is generated if this condition is not met. If this shutdown occurs, check the filter precharge relay, filter precharge resistors, and the wiring between the filter logic board and the filter precharge relay.

"FLTR PHASE A OVERCURRENT", **"FLTR PHASE B OVERCURRENT"**, or **"FLTR PHASE C OVERCURRENT"** - The maximum instantaneous harmonic filter current is monitored and compared against a preset limit. If this limit is exceeded, the unit is shutdown, and this message is generated. The filter current is monitored using two DCCTs, and these signals are processed by the filter logic board. The preset limits are as follows:

292/351 HP = 356 Amps
419/503 HP = 496 Amps
658/790 HP = 745 Amps

If you experience this shutdown and the VSD auto-restarts and continues to run properly with the filter operating, it is likely the filter tripped on overcurrent due to a sag or surge in the voltage feeding the chiller. If this happens frequently, contact the YORK Product Service Group for suggestions on how to improve the situation. If this message re-occurs, preventing the unit from being restarted, you will need to check the filter power assembly for shorted transistors by measuring from wires 519, 518, and 517 to the filter's positive bus, checking in both directions, and from 519, 518, and 517 to the filter's negative bus in both directions. None of the readings should be less than 5 ohms.

"FLTR PHASE LOCK LOOP FLT" - This shutdown indicates that a circuit called a phase locked loop on the filter logic board has lost synchronization with the incoming power line for a period of time. This is normally an indication that one of the filter's incoming power fuses is blown. Check filter power fuses 11FU, 12FU, and 13FU if this shutdown occurs. If the fuses are OK, check the output of the line voltage isolation board at J5, pins 1, 2, and 3 on the filter logic board. With 480 VAC present on the input to the line voltage isolation board, 1.7 VAC should be present from pins 1 to 2, pins 2 to 3, and pins 3 to 1 at J5 on the filter logic board.

"FLTR POWER SUPPLY FLT" - This shutdown indicates that the low voltage power supplies on the filter logic board have dropped below their permissible operating voltage range. The filter logic board receives its power from the VSD logic board via the ribbon cable which connects the two. The power supplies for the logic boards are in turn derived from the secondary of the 120 to 24 VAC transformer (transformer 2T in figure 1) which in turn is derived from the 480 to 120 VAC control transformer (transformer 1T in figure 1). If this shutdown occurs, check the CR10 LED, labeled "Power Supply OK". If this is not illuminated, check the ribbon cable connecting the filter logic board to the VSD logic board. If the CR10 LED is illuminated, you likely have a faulty filter logic board, and it needs to be replaced.

"FLTR RUN RELAY FLT" - When a digital run command is received at the filter logic board from the VSD logic board via the 16 position ribbon cable, a 1/10 second timer is begun. A redundant run command must also occur on the serial data link from the VSD logic board via the ribbon cable before the timer expires; otherwise, the unit will be shutdown, and this message will be displayed. If this shutdown occurs, check the integrity of the 16 wire ribbon cable installed between the VSD logic board and the filter logic board. If the problem persists, replace the VSD logic board and, if the problem remains, the filter logic board.

"HIGH AMBIENT TEMPERATURE FLT" - The ambient temperature monitored is actually the temperature detected by a component mounted on the VSD logic board. The high ambient trip threshold is set for 140° F. Some potential causes for this shutdown are internal VSD fan failure, VSD water pump failure, or an entering condenser water temperature which exceeds the allowable limit for the job. Additional causes for the shutdown include:

Plugged Strainer - The standard 1.5" Y-strainer contains a woven wire mesh element with 20 stainless-steel wires per inch. This has been found to work adequately in most applications. Some users may have very dirty condenser water which can cause the strainer to plug. Locations with special conditions may want to consider a dual strainer arrangement with quarter turn valves to permit cleaning of one strainer with the unit still on-line.

Plugged Heat-Exchanger - In cases where the strainer plugs frequently, the heat-exchanger eventually may plug or become restricted to the point of reduced flow. At this point we suggest you back-flush the heat-exchanger by reversing the two rubber hoses which supply condenser water to/from the heat-exchanger. If the rust or sludge cannot be back-flushed, you may need to replace the heat-exchanger.

Low Condenser Flow - The VSD system requires 8 feet of pressure drop across the heat-exchanger to maintain adequate GPM. If the pressure drop is less than 8 feet, it will be necessary to correct the flow problem or add a booster pump as is applied on retrofit chillers.

"HIGH CONVERTER HEATSINK TEMP" - Reference **"HIGH PHASE A HEATSINK TEMP"**, **"HIGH PHASE B HEATSINK TEMP"**, or **"HIGH PHASE C HEATSINK TEMP"** below for the troubleshooting procedure. The thermistor sensor is located on the AC to DC SCR/Diode semi-converter heatsink. This shutdown requires a manual reset via the "Reset" push-button on the VSD logic board.

"HIGH PHASE A HEATSINK TEMP", **"HIGH PHASE B HEATSINK TEMP"**, or **"HIGH PHASE C HEATSINK TEMP"** - This shutdown will occur if the heatsink temperature exceeds 158° F on any of the output pole assemblies. This shutdown requires a manual reset via the "Reset" push-button on the VSD logic board. This shutdown will seldom occur, since in most cases where the coolant temperature has risen abnormally the VSD will trip on "ambient temperature" (140° F) before the heatsinks can reach 158° F. If this message does occur, make certain you have an adequate level of coolant, check to be sure the

cooling pump is operating when the unit is running, and check the strainer in the primary of the heat exchanger for clogs and silt. If no cause is found, the culprit may be a bad temperature sensor on an output pole assembly. Using an ohm-meter, check the resistance of the thermistor at plug P2 on the VSD logic board. The thermistor resistance should be 10K ohms at 77° F. A resistance versus probe temperature chart is shown below.

Temperature Deg. F	32	50	59	77	100	115	140
Resistance	Infinite	19.9K	15.7K	10K	5.8K	4.2K	2.5K

"INVALID CURRENT SCALE FAULT" - The J1 connector on the VSD logic board contains jumpers along with wires from the output CTs. Since the part number of the logic board is the same on all horsepower sizes, the jumpers tell the logic board the size of the VSD being employed in order to properly scale the output current. If the jumper configuration is found by the logic to be invalid, the system will be shutdown, and the this message will be generated. The proper jumper configuration is shown on the wiring label for the VSD.

"INVERTER INITIATED STOP FAULT" - Whenever the VSD initiates a fault, it first opens the IIS relay in the VSD (between #53 and #16). It then sends a message serially to the ACC, detailing the cause of the fault. If this #53 to #16 circuit ever opens without receiving an accompanying cause for the trip over the serial link (within 11 communication tries, approximately 22 seconds), this message will be displayed. Loose wiring is often the culprit of this problem. Check the #1 to #53 horseshoe jumper in the panel and all other wiring involving #53 and #16.

"LOW CONV HEATSINK TEMP", **"LOW PHASE A HEATSINK TEMP", "LOW PHASE B HEATSINK TEMP"**, or **"LOW PHASE C HEATSINK TEMP"** - A heatsink temperature sensor indicating a temperature below 37° F will cause the unit to shutdown and display this message. In most cases the problem will actually be an open thermistor or broken wiring to the thermistor. The normal thermistor resistance is 10K ohms at 70° F. Check the circuit for continuity at VSD logic board plug J2. Also, make certain one side of the circuit is not shorted to the cabinet. Sometimes a thermistor wire can be pinched between the heatsink and the cabinet.

"LOW DC BUS VOLTAGE FLT" - If the DC link drops below 500 VDC (or 414 VDC for 50 HZ), the drive will initiate a system shutdown. A common cause for this shutdown is a severe sag in the incoming power to the drive. Monitor the incoming three-phase AC line for severe sags and also monitor the DC link with a digital meter. If the AC line or the DC link voltage is not dropping, check the wiring and connections from the DC link to the voltage isolator board (wires 224, 225 and 226) and from this board to the VSD logic board (221, 222 and 223). Also check the associated connectors. If no problem is found, try replacing the bus isolation board (031-01624) and the VSD logic board.

"MAIN BOARD POWER SUPPLY" - This shutdown is generated by the VSD logic board, and it indicates that the low voltage power supplies for the logic boards have dropped below their allowable operating limits. The power supplies for the logic boards are derived from the secondary of the 120 to 24 VAC transformer (transformer 2T in figure 1) which in turn is derived from the 480 to 120 VAC control transformer (transformer 1T in figure 1). This message usually means that power to the VSD was removed. If this was not the case, check the DC voltage test points on the VSD logic board at TPC (+15V), TPD (+10V), TPE (+5V), TPF (+7.5V), and TPG (-15V) with respect to TPH (Ground). If any of these voltages are incorrect, replace the VSD logic board.

"OUTPUT CURRENT IMBALANCE" - Normally the three phases of output current will be closely balanced since the voltage being applied to the motor is derived from the same DC link voltage and the output transistors all switch in an identical pattern. Thus, most imbalances will be due to variations in the motor windings, which may be as high as 8% typically. If this shutdown should occur, first check the log of output currents in each phase from the history display. Then measure the actual motor currents with a digital meter. If the imbalance is real, you are likely facing a pole problem. However, in most cases you will find the measured currents are false, and the problem is likely due to a bad CT, wrong value CT, faulty wiring to the CT, or a bad VSD logic board. Using a DVM set to the AC voltage scale, connect one lead to the GND test point on the board. Connect the remaining lead to the top of each of the three CT terminating resistors R1, R2 and R3. Measure the three voltages at the top of each resistor. If they are equal, the problem is the logic board.

"PHASE A GATE DRIVER FLT", **"PHASE B GATE DRIVER FLT"**, or **"PHASE C GATE DRIVER FLT"** - A second level of current protection exists on the VSD driver boards themselves. The collector to emitter saturation voltage of each IGBT is checked continuously while the device is being gated on. If the voltage across the IGBT is greater than a set threshold, the IGBT is gated off, and a shutdown pulse is sent to the VSD logic board shutting down the entire VSD system. To diagnose the problem, first check the LEDs on the gate driver board on the phase indicated in the message. Usually one of the two LEDs will be out. This clearly points to a bad gate driver and requires replacement of the complete pole assembly for that phase. If both LEDs are out, check for 120VAC at the 2-pin connector to the gate driver. If 120VAC is present, both LEDs should be lighted. If both LEDs are lit and the problem repeatedly occurs in one phase, swap all three pole cables at the logic board J8, J9, and J10. Plug A into B, B into C, and C into A. If the display now reports a trip in a **different** phase, the problem is either in the pole or in the cable that feeds the pole from the VSD logic board. If the display continues to report a gate driver FLT in the **same** phase, even with cables swapped, the problem is in the logic board. Once you have finished troubleshooting, **be sure to put all the cables back into their original mating connectors.** Also, be aware that a gate driver fault can be initiated when the VSD is not running.

"PHASE A OVERCURRENT FAULT", **"PHASE B OVERCURRENT FAULT"**, or **"PHASE C OVERCURRENT FAULT"** - This shutdown is generated by the VSD if the motor current exceeds a given limit. The motor current is sensed by the current transformers on the VSD output pole assemblies, and the signals are sent to the VSD logic board for processing. Maximum instantaneous permissible currents are:

351 HP = 771Amps
503 HP = 1200 Amps
790 HP = 1890 Amps

If an overcurrent trip occurs but the chiller restarts and runs without a problem, the cause may be attributed to a voltage sag on the utility power feeding the VSD that is in excess of the specified dip

voltage for this product. This is especially true if the chiller was running at, or near, full load. If there should be a sudden dip in line voltage, the current to the motor will increase, since the motor wants to draw constant horsepower. The chiller vanes cannot close quickly enough to correct for this sudden increase in current, and the chiller will trip on an overcurrent fault. Contact the YORK Product Service Group if this is confirmed to be a problem.

If the chiller will not restart but keeps tripping on this same shutdown, an output pole problem is the most likely culprit. Check that both red LEDs are illuminated on each of the pole assemblies. Also, check for output short-circuits using an ohm-meter set to the minimum ohms scale. Measure from T1 to the positive bus and from T1 to the negative bus, checking with the ohm-meter in both directions. Repeat this same check for T2 and T3.

If no short circuits are discovered in the output poles, it is also possible you have a VSD logic board problem. This is especially true if the trip occurs during startup, before the motor begins to turn. If this is the case, it is possible to monitor the motor current during startup on the logic board. Using an oscilloscope, connect the ground clip to the GND test point on the board. Connect the probe tip to the top of one of the three CT terminating resistors R1, R2, or R3. If you find that the trip occurs and no signal at all appears at the input, it is definitely a logic problem. If you do not have access to an oscilloscope and the problem fits this description **exactly**, you may want to replace the VSD logic board and see if this corrects the problem.

"PRECHARGE BUS V IMBALANCE" - This situation is identical to the above shutdown "**BUS VOLTAGE IMBALANCE FAULT**", except that it has occurred during the precharge period which begins during pre-lube.

"PRECHARGE FAULT LOCKOUT" - If the unit fails to make precharge, the precharge relay shall drop out for a time period of 10 seconds during which time the unit's fan(s) and water pump(s) shall remain energized in order to permit the precharge resistors to cool. Following this 10-second cool down period, precharge shall again be initiated. The unit shall attempt to make precharge three consecutive times. If the unit fails to make precharge on three consecutive tries, the unit shall shutdown, lockout, and display this message. In order to initiate precharge again, the micropanel’s rocker switch must first be placed into the STOP/RESET position.

"PRECHARGE HIGH VOLTAGE FAULT" - During precharge, the DC link must reach at least 500 VDC (414 VDC for 50 HZ) 15 seconds after the precharge relay is energized. The unit is shutdown, and this message is generated if this condition is not met. If this shutdown occurs, check the precharge relay, precharge resistors, and the wiring between the VSD logic board and the precharge relay.

"PRECHARGE LOW VOLTAGE FAULT" - During precharge, the DC link must be equal to or greater than 50 VDC (41 VDC for 50 HZ) ½ second after the precharge relay is energized. The unit is shutdown, and this message is generated if this condition is not met. If this shutdown occurs, check the precharge relay, precharge resistors, and the wiring between the VSD logic board and the precharge relay.

"PWM COMMUNICATIONS FAULT" - This shutdown is generated if a communications problem occurs between the two microprocessors on the VSD logic board. If this shutdown should occur, replace the VSD logic board.

"RUN RELAY FAULT" - Redundant run signals are generated by the micropanel, one via wire #24 and the second via the serial communications link. Upon receipt of either of the two run commands by the VSD logic board, a 5-second timer shall commence timing. If the missing run command is not asserted within the 5-second window, the unit will shutdown, and the micropanel will display this message. This shutdown could occur if there is a problem with the wiring between the control panel and the VSD. Check the #24 to #25 horseshoe jumper in the panel and all other wiring involved in energizing #24 in the VSD. Also check to ensure that the serial communications wiring between the VSD and the micropanel is connected properly.

"SERIAL RECEIVE FAULT" - This message is generated when communications between the ACC and VSD logic is disrupted. Check the shielded cable between J11 on the VSD logic and J8 on the ACC board. Check for continuity, and also check to see that none of the conductors are shorted together or shorted to ground. The terminal block in the lower left corner of the VSD cabinet serves as a junction point for this cable, and it is possible for strands of wire to bridge across the terminals at this location. If all wiring is intact, this problem may also be caused by electrical noise. Make certain the shield for this cable is tied to chassis ground at the control panel end only via a green chassis ground screw. If all of this has been done and communications can never be established even at power-up, you may have a bad communications driver on either the VSD logic or the ACC. Change out both the ACC and VSD logic boards. If the serial receive fault problem only occurs intermittently during times when the unit is running, the culprit could be electrical noise. At times, ferrite beads placed over the shielded cables will attenuate high frequency noise sufficiently. The part number for these ferrite beads may be found on the VSD parts list.

"SINGLE PHASE POWER SUPPLY" - This shutdown is generated by the SCR trigger control and relayed to the VSD logic board to initiate a system shutdown. The SCR trigger control uses circuitry to detect the loss of any one of the three input phases. The trigger will detect the loss of a phase within one half line cycle of the phase loss. This message is also displayed every time power to the VSD is removed or if the input power dips to a very low level. Usually it indicates that someone has opened the disconnect switch.

"START SEQUENCE INHIBITED BY VSD" - This shutdown will occur if a VSD fault takes place during the "Start Sequence Initiated" period. The chiller is inhibited from entering the starting sequence during the time period that a VSD fault occurs. When the VSD fault is cleared, the start sequence will resume.

"VSD INITIALIZATION FAILED" - At power-up, all the boards go through a process called initialization. At this time, memory locations are cleared, jumper positions are checked, and serial communications links are established. There are many causes for an unsuccessful initialization. The following check list should aid in determining why initialization has not completed:

The micropanel and the VSD must be energized at the same time. The practice of pulling the fuse in the control panel to make wiring changes will create a problem. Power-up must be done by closing the main disconnect on the VSD cabinet with all fuses in place. Be sure you do not have a blown fuse, causing loss of power to the VSD logic board.

The EPROMs must be correct for each board, and they must be correctly installed. There are a total of seven (7) EPROMs in each VSD - micropanel system. These EPROMs are created as a set and cannot be intermixed between earlier and later styles of units. Also, the ACC EPROM must be in the ACC board, and the micropanel EPROM in the microboard, etc. All pins must be properly inserted into the EPROM sockets.

Serial data communications must be established. See "SERIAL RECEIVE FAULT" and "FLTR SERIAL RECEIVE FAULT". If communication among the VSD logic, the filter logic, the ACC, and the microboard does not take place at initialization, the **"VSD INITIALIZATION FAILED"** message will occur before any other message can be generated. You can check to see that serial communications have been established by pressing the OPTIONS key and noting the %Job FLA value displayed. A zero displayed value for this parameter (and all other VSD parameters) indicates a serial communications link or EPROM problem.

If the IEEE-519 filter option is included, make sure the '519' logic board is not in continuous reset. This will be evidenced by the LEDs on the filter logic board alternately blinking. To rule out the '519' filter as the cause of initialization failure, you can disconnect the filter by switching the filter logic board's SW1 switch to the OFF position and removing the 16-wire ribbon cable between the '519' logic and VSD logic boards.

"VSD SHUTDOWN - REQUESTING FAULT DATA..." - This shutdown is initiated when the #53 to #16 circuit has been interrupted and the control panel has not yet received the cause of the fault over the

serial link. Whenever the VSD initiates a fault, it first opens the IIS relay in the VSD (between #53 and #16). The VSD then sends a message serially to the Adaptive Capacity Control (ACC), detailing the cause of the fault. Since the communications link loop is initiated every two seconds, the message should appear for just a few seconds and then be replaced with a VSD fault message.

"WARNING - FILTER DATA LOSS" - This message is displayed if the communications link between the VSD logic board and the filter logic board or the communications link between the filter logic board and the ACC board is interrupted. This message can also occur as a background message when the chiller is running. When this message is displayed all filter related parameters are replaced with X's. If communication is re-established, the message will disappear, and normal values will again be displayed. If this problem is encountered, the ribbon cable connecting the VSD logic board to the filter logic board should be checked. The integrity of the shielded communications cable between the filter logic board and the ACC board should also be checked. Finally, replacement of the filter logic board, the ACC board, and the VSD logic board should be tried, one board per try.

The following messages pertain to Original and Style "A" units only:

"FILTER DSP FAULT" - On initialization, the filter logic writes all zero's to DSP memory and then writes all one's to the same memory. If any error occurs during read-back, this message is generated. This would indicate a failure of the filter logic board.

"FILTER MEMORY FAULT" - On initialization, the filter logic writes all zero's to external memory and then writes all one's to the same memory. If any error occurs during read-back, this message is generated. This would indicate a failure of the filter logic board.

"FLTR +15 V POWER SUPPLY FLT" - This message indicates a failure of a low voltage DC regulator on the filter logic board.

"FLTR -15 V POWER SUPPLY FLT" - This message indicates a failure of a low voltage DC regulator on the filter logic board.

"FLTR -5 V POWER SUPPLY FLT" - This message indicates a failure of a low voltage DC regulator on the filter logic board.

"FLTR A/D CONVERTER FLT" - The '519' filter logic does a check where it looks at ground and converts the voltage to a digital value. This level should be zero; however, if there is electrical noise present on ground, this value will be greater than zero, and this fault message may appear. Locations experiencing this nuisance message can bypass this check by installing a special EPROM in the '519' filter logic board. Contact the YORK Product Service Group for this EPROM.

"FLTR CO-PROCESSOR FLT" - This message indicates a clock timing problem has occurred on the filter logic board. If this occurs more than once, replace the filter logic board.

"FLTR HIGH INPUT V FLT" - The input voltage as measured phase to ground and in "peak" volts must not exceed 424.6 volts peak. If exceeded for over 30 seconds, this message will be generated. The normal cause will be a high utility voltage; for example, greater than 500 VAC on a 460 VAC system. Since our systems are designed to operate up to 506 VAC, if this becomes a source of nuisance trips, contact the YORK Product Service Group for advice.

"FLTR INPUT FREQUENCY FLT" - The input frequency as measured by the filter logic is outside the acceptable range of +/- 1 Hertz.

"FLTR LOW HEATSINK TEMP FLT" - The temperature as measured by the filter's thermistor (2 thermistors on 790 HP) has dropped below 37° F. This may be caused by an unplugged thermistor, loose

connections, or a wire pinched against the chassis. Normal thermistor value is 10K ohms at 77° F. An open circuit will simulate a temperature of 32° F.

"FLTR PHASE ROTATION FLT" - The filter determines phase rotation upon receiving a run signal. Once determined, the phase rotation must remain constant for 30 line cycles. If not, this message will be generated. The most likely cause of this message would be an interruption in utility power supplying the VSD.

"FLTR SERIAL RECEIVE FAULT" - This message would occur on some early installations with the IEEE-519 filter option. It is related to the level of electrical noise picked up on the serial communications lines. We have corrected this by a modification to the filter logic board. Filter logic boards (P/N 031-01632-002 or 001) of a "G" revision or later should not experience this problem.

"FLTR SW-BACKGRND FLT" (or **"FLTR SW-PRECHARGE LOOP FLT"** on early units) - This message means the software did not complete the program loop in the allotted time. This is a watchdog timer function on the filter logic board.

"FLTR THERMISTOR SUPPLY FLT" - This message indicates a failure of a low voltage DC regulator on the filter logic board.

"FLTR TRIANGLE WAVE FLT" - This message was intended as a check of the '519' logic board's internal triangle waveform generator. However, the accuracy of the measuring circuit on the board can have as much error as the generator it is trying to measure, resulting in nuisance shutdowns. If this message occurs repeatedly, it can be corrected by installing a special EPROM. Contact the YORK Product Service Group in this case.