

Shot Director Instructions for Handling AFC Faults S-AB-P-123 Rev B

Introduction:

The Amplifier Facility Controllers (AFC's) detect problems with the amplifiers and their supporting subsystems that impact their safety and operational readiness. The AFC senses anomalies in coolant flows; pump module door positions and the presence of coolant in the drip trays. A problem in any of these areas causes the "Amp-OK" signal to the associated PCUs to be interrupted, thus indicating a fault condition. This fault condition prevents the power conditioning unit (PCU) from charging, or will cause the PCU to dump if it is charging.

Because AFC's report problems that may be due to faulty sensors, broken optical fibers, or faulty I/O modules within the AFC, the interlock system is may be defeated to allow Shot Operations to continue. This action may be invoked only with the express permission of the Shot Director. This action blinds the system to one or more potential faults that could result in system damage or cause operational delays. Correct communication and monitoring actions are, therefore, extremely important.

Since the AFC is PLC based, it is possible to enable a "Bypass" in software. When a fault occurs, the AFC status panel indicates an enlarged solid red indicator. To bypass the affected sensor it is a simple matter of touching the faulted indicator on the status panel. The indicator will remain red with a flashing yellow circle around the indicator. The circuit will remain bypassed until either cleared by an operator (by re-pressing the indicator) or a shot is executed. When a shot is executed all circuits in the system are cleared, resulting in actual fault conditions being detected and the AFC will respond accordingly.

Policy:

- The decision and responsibility to manually override an AFC fault resides with the Shot Director (SD).
- Permission to override an interlock must be obtained from the Shot Director.
- When an amplifier fault is detected, the SD, PCT, and AT shall work together to correct the problem or defeat the interlock as outlined in procedure below.
- When an interlock is defeated, an entry shall be made in the Material Deficiency Log citing the root cause of the problem (i.e.: B11 Leak Fault).
- The AT is charged with maintaining these entries and coordinating timely repairs. The AT is expected to make every effort to effect repairs between shots.
- The AT shall coordinate AFC I/O or optical fiber repair actions in conjunction with the Electronic Shop personnel. All other repairs shall be the responsibility of the AT.
- The AT shall ensure that the SD and PCT are aware of the status and results of all repair activities.

Procedure:

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- 1 When an AFC fault problem is detected, the SD, AT and the PCT shall agree upon how and when to effect repairs.

The AT shall assess the situation and determine:

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- If there exists a real problem with the amplifier or structure that must be corrected before proceeding;
 - or, if there is a problem with a sensor that can be corrected promptly;
 - or, if there is a problem with a sensor that cannot be corrected promptly.

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- 3 If the decision is reached that the problem cannot be resolved promptly, the SD may (at his discretion) instruct the AT to defeat the interlock using the appropriate procedure below.

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- 4 If the decision is to correct the problem immediately, the provisions of *Lockout and Tagout Procedures per LFORM 4004* shall be followed prior to performing corrective action.

Pump Module Sensor By-pass. If the problem is a pump module location sensor, the sensor may be “bypassed”.

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- Approach the AFC and check for the fault condition that has caused a failure of the “Amp-OK” signal.
 - Verify whether or not the fault is real.
 - For a pump module fault: Confirm that the pump modules are closed and that the sensor flags are in the “Up” position.
 - If a pump module is open or ajar, restore the pump module to the fully closed position and check to see if this action cleared the fault.
 - If any sensor flag(s) are in the down position, then the sensor is broken and must be noted in the Amplifier Material Deficiency List and the sensor can be bypassed.
 - If the sensor fault persists then the fault is likely to be in the fiber to the AFC or the I/O module in the AFC. In either case the sensor fault is not real and it may be bypassed.
 - Touch the indicator to bypass the faulty sensor.
 - If necessary, restart the flow to the amplifiers by pushing the “Start” button on the lower left hand corner of the touch panel.
 - Wait 10 seconds and verify correct operation of the AFC by observing all sensors on the touch panel are green.
 - The AT shall ensure that an “Xnn AFC pump module sensor fiber or faulty I/O module” entry is made in the Controls Material Deficiency List.
 - The AT shall ensure that the Electronic Shop Manager is notified of this action via e-mail and/or telephone; no later than by the end of his watch.

Leak Detector Sensor By-pass. If the problem is a leak sensor, the sensor may be “bypassed”.

- Approach the AFC and check for the fault condition that has caused a failure of the “Amp-OK” signal.
- Verify whether or not the fault is real.
 - For a Leak fault: Confirm that the all drip trays are dry.
- If the leak fault is real it must be repaired prior to proceeding. Repair and restart the AFC.
- If the drip trays are dry, and the sensor fault persists then the fault is likely to be in the fiber to the AFC or the AFC’s I/O module. In either case the sensor fault is not real it may be bypassed.
- Touch the indicator to bypass the faulty sensor.
- Restart the flow to the amplifiers by pushing the “Start” button on the lower left hand corner of the touch panel.
- Wait 10 seconds and verify correct operation of the AFC by observing all sensors on the touch panel are green.
- The AT shall ensure that an “ Xnn AFC leak detector sensor fiber or faulty I/O module” entry is made in the Controls Material Deficiency List.
- The AT shall ensure that the Electronic Shop is notified of this action promptly; no later than the end of his watch.

Flow Sensor By-pass. If the problem is a flow sensor, the sensor can be “bypassed”.

- Approach the AFC and check for the fault condition that has caused a failure of the “Amp-OK” signal.
- Verify whether of not the fault is real.
 - For a Flow fault: Confirm that all plumbing connections are fully engaged and that there is no visible debris in the flow sensor.
- Attempt to restart the flow to the amplifiers by pushing the “Start” button on the lower left hand corner of the touch panel.
- If the AFC remains fully green then all sensors are working properly.
- If the AFC should stop flow and indicate a flow fault, push the “Bypass” button on the bottom right corner of the touch panel. All flows will now be restarted.
- The AT must now check the faulty sensor.
- If the sensor is moving continuously at a speed comparable to neighboring sensors then the fault is likely to be in the fiber to the AFC or the I/O module in the AFC. In either case the sensor fault is not real it may be bypassed. The AT shall ensure that an “Xnn AFC flow sensor fiber or faulty I/O module” entry is made in the Controls Material Deficiency List.
- If the sensor is not moving continuously at a speed comparable to neighboring sensors or not moving at all, then there a problem with the cooling circuit (bricks, quick disconnects, flow sensor or an obstruction)

and must be noted in the Amplifier Material Deficiency List.

- Touch the indicator for the faulty sensor to bypass.
- Restart flow by pushing the “Start” button.
- Wait 10 seconds and verify correct operation of the AFC by observing all sensors on the touch panel are green.
- The AT shall ensure that the Electronic Shop is notified of this action promptly; no later than the end of his watch.

AFC Bypass. If the problem persists after all faulty sensors have been bypassed, it is not possible to bypass at the AFC. Instead the jumper must be made by the PCT.

- The PCT shall simulate an ‘Amp-OK’ signal to the appropriate cluster of PCU’s. This is done by pressing the AFC Bypass push-button indicator on the CATS enclosure and releasing it once it has illuminated (flashing). The bypass is good for one shot and will reset when the next trigger is received. The bypass may be reset by pressing the pushbutton again until the lamp extinguishes.
- The fault is likely to be in the fiber from the AFC to the PCU “Amp-OK” fanout or the I/O module in the AFC. The AT shall ensure that an “ ____ AFC “Amp-OK” fiber or faulty I/O module” entry is made in the Controls Material Deficiency Log.
- The AT shall ensure that the Electronic Shop is notified of this action promptly; no later than the end of his watch.

NOTE: In this situation, the PCUs are jumpered and problems other than those detected by the effected sensor(s) will not prevent or abort shots.

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Document Release:

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