

Technical Service Bulletin 990611

Periodic Crowbar Testing IOX/DCX

This service bulletin is a re-release of service bulletin 061199 and concerns Thomson IOX and DCX series of IOT-equipped UHF television transmitters.

Thomson is sending this mailing to inform you of the importance of making a crowbar test part of your regular monthly maintenance procedure. The thyatron tube contained in the crowbar assembly has a finite life and consequently needs to be tested as a normal part of transmitter maintenance.

The crowbar assembly has a number of protection circuits to monitor the operating parameters of the thyatron. (see HPA manual – Dual Gap Crowbar Assembly). If the thyatron fulfills all of the criteria set by these protection circuits, the assembly sends a “crowbar ready” signal to the HPA controller and high voltage may be applied to the IOT. However, despite of all these “check” circuits, it is still possible for an end-of-life thyatron to trigger and fire when needed, but not fully suppress an arc internal to the IOT (i.e. high voltage does not fall completely to zero upon firing). For this reason, it is important to periodically confirm correct crowbar operation by performing a test firing as part of a regularly scheduled maintenance program.

The following section contains the major crowbar test firing procedures in use today.

| Procedure 990611a: Off-line Crowbar Test Fire Procedure, IOX/DCX | |
|---|---|
| Applicability | All IOX and DCX transmitters. |
| Prerequisites | High voltage activated. High voltage relay in ISOLATE state. |
| Equipment Required | None. |
| Comments | This procedure tests the firing circuits and crowbar integrity, but not the arc sensing circuits. |

1. Press the **HPA START MODE** button to turn high voltage off.
2. Immediately press the **Crowbar Test** button to test fire the crowbar while the high voltage is still 25kV – 30kV. The beam voltage **must** drop to near zero volts (< 5 kV). If the crowbar circuit fires, but some beam voltage remains after the test firing, the thyatron should be replaced **immediately** as it may not be offering full protection to the IOT in the event of an internal arc.
3. Return to normal operation.
4. Procedure complete.

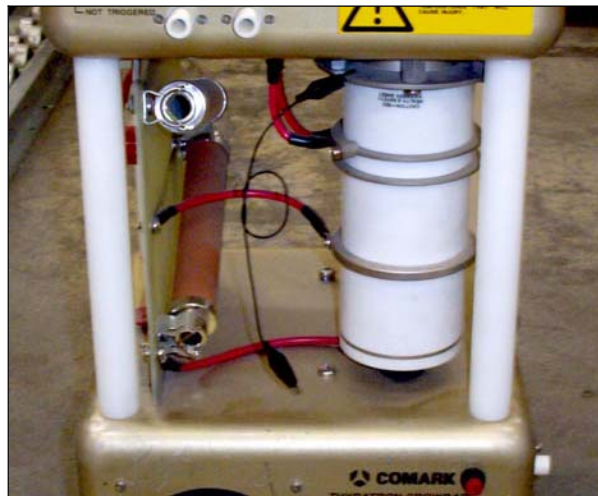


| Procedure 990611b: On-line Crowbar Test Fire Procedure, IOX/DCX | |
|--|--|
| Applicability | IOX, DCX transmitters with type 410966-01 HPA Controller (w/ LCD screen). |
| Prerequisites | Transmitter in HPA Start Mode and ready for application of HV. High voltage relay in ISOLATED state. |
| Equipment Required | None. |
| Comments | This procedure tests the firing circuits and crowbar integrity, but not the arc sensing circuits. It largely duplicates the test contained in Procedure 990611a and has fallen out favor among customers. It may still be useful for testing the proper operation of UPS systems or 480VAC circuits in response to crowbar event, as the 480VAC feed is still on-line when the crowbar test fires. |

1. Press the **Information Access** button next to the display window.
2. Press the **System Operations** button next to the display window.
3. Press the **HPA Maintenance** button next to the display window.
4. Enter the technician level password. Default is 4444, if it has not been changed.
5. Press the **Diagnostic Modes** button next to the display window.
6. Enter the administration level password. Default is 55555, if it has not been changed.
7. Press the **Diagnostics Mode** button next to the display window.
8. Select **2** for diagnostic mode and press OK.
9. Press the **BEAM MODE (or HV Beam)** button to turn HV on.
10. Press the **Crowbar Test** button to test fire the crowbar. The beam voltage **must** drop to near zero volts (< 5 kV). If the crowbar circuit fires, but some beam voltage remains after the test firing, the thyatron should be replaced **immediately** as it may not be offering full protection to the IOT in the event of an internal arc.
11. Select **1** for normal mode and press OK.
12. Press the **Previous** menu button.
13. Press the **Previous** menu button.
14. Press the **Previous** menu button.
15. Press the **Exit** menu button.
16. Procedure complete.

| Procedure 990611c: True Arc Crowbar Test Fire Procedure, IOX/DCX | |
|---|---|
| Applicability | All IOX and DCX IOT transmitters. |
| Prerequisites | High voltage extinguished. High voltage relay in ISOLATE state. |
| Equipment Required | None |
| Comments | This procedure tests the firing circuits, crowbar integrity, and arc sensing circuits by creating a true arc. It should only be used if there is a reason to suspect a malfunction of the crowbar arc sensing circuitry. (e.g. crowbar test fires successfully in response to test button, but IOT is left with greatly reduced idle current after a crowbar event...indicating that an arc has been dissipated inside the tube). This test is rarely performed. |

1. Gain access to high voltage compartment via key interlock system.
2. Discharge all high voltage circuits with grounding hook.
3. Carefully attach alligator-clip jumper cable to high voltage (upper) section of crowbar assembly. Allow jumper to hang down until it approaches, but does not touch, low voltage (lower) case of crowbar assembly. Leave a space of approximately 1.5 cm. between pointed end of jumper and low voltage case of crowbar assembly. (see black jumper cable in photo)



4. Close high voltage compartment and restore keys to proper positions.
5. Press **BEAM MODE** (or **HV Beam**) button to start HPA and commence crowbar filament warm-up cycle.
6. When filament warm-up cycle is complete, the controller will attempt to apply high voltage to the cabinet. The high voltage should initially ramp up to its full voltage, but arc



across the 1.5 cm gap after a random period of time, typically one to ten seconds. Crowbar should fire and the beam voltage **must** drop to near zero volts (< 5 kV).

If the crowbar circuit fires, but some beam voltage remains after the test firing, the thyatron should be replaced **immediately** as it may not be offering full protection to the IOT in the event of an internal arc.

If an arc occurs, but the crowbar fails to trigger and fire, there may be a problem with the arc sensing circuits. Check the connections of J3 and J4 and ensure that they have not been inadvertently reversed. Open the high voltage (upper) section of the crowbar and look for damage to or near current sensing toroid T2. Replace faulty components as necessary.

If no arc occurs, repeat test with smaller spacing between end of jumper and ground. Observe proper high voltage safety precautions at all times.

7. De-activate high voltage and return equipment to original condition.
8. Procedure is complete.

Please do not hesitate to contact Thomson Customer Service with any question you may have concerning the information contained in this service bulletin.

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