



## Expos-AID AEC Interface Requirements

The Expos-AID AEC is compatible with x-ray generators that have the following characteristics:

1. Exposure start<sup>1</sup> signal 10-30 VDC (signal must be present during entire exposure).
2. kVp signal, AC or DC voltage directly proportional to kVp (10-100 VDC for maximum kVp, AC signal up to 600 VAC).
3. mA signal, developed by inserting a resistor in series with the ground return lead of the high voltage transformer primary. This signal is for mAs limit and mAs readout.
4. Chamber selection<sup>2</sup> signals for multiple chamber installations.
5. Fast-acting signals for exposure termination.

The AEC makes available a set of isolated normally-open or normally-closed contacts for use in exposure termination. Total system delays are less than 1 mS.

### 6. Power Connections

The AEC is factory wired for 230 VAC. The system may be reconfigured for 115 VAC. Connect the AEC to a power source that goes on and off with the generator system power.

Check to see that cable lengths are adequate (45' cables are supplied standard and longer cables may be special ordered). Be aware that room must be available in the film holder or bucky for an AEC entrance type detector between the grid and the film. An exit type photo-timing bucky is not normally suitable for ion chamber installation.

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<sup>1</sup> Signal 1, exposure start, may be developed by using a set of isolated normally open contacts that close at exposure start.

<sup>2</sup> Signal 4, chamber selection, may be developed by using a set of isolated normally open contacts that close for the selection of a particular ion chamber. Signals 1 and 4 are ultimately used to energize DC relays in the AEC.

## Exposure Start Function

If an isolated set of normally-open relay contacts that close during exposure is available in the x-ray generator, then the AEC internal 12 VDC supply may be used to activate the AEC exposure start relay.

Alternatively, a  $\pm 10$  to  $\pm 15$  VDC or  $\pm 20$  to  $\pm 30$  VDC signal may be used from the x-ray generator during exposure referenced to generator common (DC loading is less than 30 mA). Be careful not to affect the generator circuitry or overload the supplies when making a direct DC connection.

## kVp Compensation

An AC or a DC signal directly proportional to kVp is required to compensate for the nonlinear response of x-ray film as kVp is varied.

If a DC signal proportional to kVp is used it must be a positive ground referenced signal no greater than 100 VDC at the highest kVp. Be careful not to affect the generator circuitry or overload the supplies when making a direct DC connection.

If an AC signal is used, such as the H.V. transformer primary voltage, wiper variac voltage, etc. it must be less than 600 VAC at the highest kVp. Fuse this signal at its source with the fuseblock provided. A signal such as the H.V. transformer primary voltage tends to vary with large changes in mA and may not be the best choice for systems that operate over a wide range of mA.

## mA Signal

Tube current is measured by inserting a 7.5-ohm sensing resistor in the x-ray generator M1 or M2 circuit. Normally the "mA in" terminals of the mA signal interface box are put in series with the M1 or M2 signal line between the High Voltage transformer and any existing generator mA sense circuitry. Use an oscilloscope to verify that the voltage at M1 or M2 does not exceed 100VDC positive or negative with respect to ground during high mA exposures prior to making the AEC mA sense connection. Consult the factory for alternate methods of connection if a high voltage condition exists at M1 or M2 during high mA exposures.

The 7.5-ohm sensing resistor is located in the mA signal interface box for the AEC. Usually the sensing resistor may be inserted at approximately the same point used for measuring mAs with a mAs meter.

## Chamber Selection

Table bucky, chest chambers and spot film chamber may be accommodated

If isolated sets of normally open switch or relay contacts are to be used for chamber selection, use of the internal AEC 12 VDC to energize chamber selection relays RY5, RY6 and RY7.

Relays may be energized directly by supplying 12 VDC or 24 VDC signals directly to those relay coils. Be careful not to affect the generator circuitry or overload the supplies when making a direct DC connection.

## Exposure Termination

A set of relay contacts<sup>1</sup> is used to signal the generator to terminate the exposure. The relay will operate whenever the AEC determines that proper exposure has occurred or when the exposure rate exceeds 570 mAs. It is important that the AEC be connected in such a way that the operator cannot make a second exposure by holding down the generator's exposure start control. Means of externally terminating an exposure will vary with different generators. Proper means of connecting the exposure stop signal from the AEC to the x-ray generator can best be obtained by contacting the manufacturer of the generator.

Two (2) contact leads are provided on the generator interface cable and are labeled Exposure Stop. Selection is provided for a set of normally open relay contacts that close for exposure stop or a set of normally closed contacts that open for exposure stop.

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<sup>1</sup> Note that the AEC exposure stop contact on-resistance is slightly more than 100 ohms, and that the exposure stop contacts are not to be used directly in high voltage or high current circuits including all 120 VAC circuits. The exposure stop contacts may be used to energize a 12 VDC or 24 VDC relay which could be used as an interface to a high voltage circuit. A fast acting relay is required in this application. If using AID forced commutation, the exposure stop response time will not be altered significantly; otherwise, a test for minimum response time of the system must be made.

## Equipment Supplied

The following assemblies, cables and hardware are supplied as the components of a complete Expos-AID AEC System:

Item	Qty	Description	AID Part #
A	1	Control Mounting Bracket	50562
B	1	Owner's Manual	69018
C	1	Mounting Hardware Kit	70018
D	1	Cable, Control/Display	73106
E	1	Cable, mA	73105-mA
F	1	Cable, A.C. kVp Signal	73105-kVp
G	1	Cable, Generator Interface	73104
H	1	Interface Chassis & Cover	77027
J	1	Control/Display Unit	77035
K	1	kVp signal fuse block, fuses, mounting plate, fishpaper	70019
L	1	mA signal interface box	71211
M	2	1/2 Amp., 250 V. fuses	45004
N	1	set rack mount brackets	50591

Note: Chambers, paddle and connecting cables are sold and supplied separately.

## Equipment Required

- A. Electric Drill with 5/32", 3/16" and 1/8" high speed drill bits.
- B. Assorted screwdrivers (slot and Phillips head).
- C. Tools and fittings as required for routing cables in conduit or raceways.
- D. Tools, lugs and/or connectors as required for making connections into the x-ray generator system.

The Expos-AID Automatic Exposure Control is an FDA certified component. After completing the installation and calibration the installer must file an assembler's report on form FDA2579.