PROPER USE AND SAFE OPERATING PRACTICES WITH RESPECT TO POWER TUBES ARE THE RESPONSIBILITY OF EQUIPMENT MANUFACTURERS WHO INCORPORATE THE TUBE INTO EQUIPMENT AND USERS OF SUCH TUBES AND EQUIPMENT. THE SUPPLIER OF THIS POWER TUBE PROVIDES INFORMATION ON ITS PRODUCTS AND ASSOCIATED HAZARDS, BUT IT ASSUMES NO RESPONSIBILITY FOR AFTER-SALE OPERATING AND SAFETY PRACTICES. LIMITED LIFE AND RANDOM FAILURES ARE INHERENT CHARACTERISTICS OF ELECTRON TUBES. TAKE APPROPRIATE ACTION THROUGH REDUNDANCY OR OTHER SAFEGUARDS TO PROTECT PERSONNEL AND PROPERTY FROM TUBE FAILURE.

ALL PERSONS WHO WORK WITH OR ARE EXPOSED TO POWER TUBES OR EQUIPMENT WHICH UTILIZES SUCH TUBES MUST TAKE PRECAUTIONS TO PROTECT THEMSELVES AGAINST POSSIBLE SERIOUS BODILY INJURY. DO NOT BE CARELESS AROUND SUCH PRODUCTS.

OPERATING INSTRUCTIONS
This Operating Hazards Sheet, any packing and unpacking instructions, installation instructions, operating instructions, and relevant test data which may be included with this Power Tube can help you to operate this tube safely and efficiently. READ THEM. The Technical Data Sheet for this power tube provides operating specifications for individual products and other application information. Uninformed or careless operation of this tube can result in poor performance, damage to the tube or property, serious bodily injury, and possibly death.

Caution regarding tube operation or safety matters should be addressed to the Applications Engineering Department.

WARNING—SERIOUS HAZARDS EXIST IN THE OPERATION OF POWER TUBES
The operation of power tubes involves one or more of the following hazards, any one of which, in the absence of safe operating practices and precautions, could result in serious harm to personnel:

a. HIGH VOLTAGE—Normal operating voltages can be deadly. See below for additional information.

b. RF RADIATION—Exposure to RF radiation may cause serious bodily injury possibly resulting in blindness or death. Cardiac pacemakers may be affected. See below for additional information.

c. X-RAY RADIATION—High voltage tubes can produce dangerous, possibly fatal X-rays. See below for additional information.

d. BERYLLIUM-OXIDE POISONING—Dust or fumes from BeO ceramics used as thermal links with some insulated and power tubes are highly toxic and can cause serious injury or death. See below for additional information.

e. GLASS EXPLOSION—Some electron tubes have glass envelopes. Breaking the glass can cause an explosion, which will result in an explosive scattering of glass particles. Handle glass tubes carefully. See below for additional information.

f. HOT WATER—Water used to cool tubes reaches scalding temperatures. Touching or exposure of the cooling system can cause serious burns. See below for additional information.

g. HOT SURFACES—Surfaces of air-cooled radiators and other parts of tubes can reach temperatures of several hundred degrees centigrade and cause serious burns if touched. See below for additional information.

Additional specific information about power tube hazards:

HIGH VOLTAGE
Many power tubes operate at voltages (>50 volts) high enough to kill through electrical shock. Design equipment utilizing these tubes to prevent personnel contact with high voltages. Securely attach prominent hazard warnings. Personnel should always break the primary circuits of the power supply and discharge high voltage capacitors when direct access to the tube is required.

RF ENERGY
RF energy must be contained properly by shielding and transmission lines. All input and output RF connections, such as cables, flanges and gaskets must be RF leakproof. Never operate a power tube without a properly matched RF energy absorbing load matched. Never look into or expose any part of the body to an antenna or open RF generating tube or circuit or RF transmission system while it is energized. Monitor the tube and RF system for RF radiation leakage at regular intervals and after servicing.

X-RAY RADIATION
As operating voltages increase beyond 15 kilovolts, power tubes are capable of producing progressively more dangerous X-ray radiation. Dangerous X-ray radiation is more likely from high-power transmitting tubes, many pulse-modulator tubes, high-vacuum rectifier tubes, and all older high voltage tubes that may have undergone changes in emission characteristics with aging and gradual deterioration. Provide adequate X-ray shielding on all sides of these tubes, particularly around the anode as well as the modulator and pulse transformer where these are used. Check X-ray levels. NEVER OPERATE HIGH VOLTAGE TUBES WITHOUT ADEQUATE X-RAY SHIELDING IN PLACE. MONITOR THE TUBE AFTER SERVICING AND AT REGULAR INTERVALS FOR POSSIBLE CHANGES IN X-RAY LEVELS DUE TO AGING.

DANGER:

BERYLLIUM OXIDE CERAMICS (BeO)—AVOID BREATHING DUST OR FUMES
BeO ceramic material is used only in the following CPV/EIMAC products:

CV-8051 SK-3040 4CS250R
SK-3010 SK-3060 Y9216
SK-3012 SK-3064 K1 Klystron8s
SK-3020 SK-3080

Do not perform any operation on any BeO ceramic which might produce dust or fumes, such as grinding, grit blasting and acid cleaning. BERYLLIUM OXIDE DUST OR FUMES ARE HIGHLY TOXIC AND BREATHING THEM CAN RESULT IN SERIOUS INJURY OR DEATH. ALSO, FLYING CHIPS DUE TO CRUSHING, SMASHING OR SHATTERING COULD BECOME LODGED IN THE SKIN AND CAUSE SERIOUS INJURY OR DEATH. IF YOU FEEL YOU WERE EXPOSED TO THESE HAZARDS, SEEK MEDICAL ATTENTION IMMEDIATELY. Because BeO warning labels may become obliterated or removed, you are urged to contact your tube supplier before performing any work which might affect any external thermal link, heat sink or H. V. Insulator on any of the above listed products.

When BeO ceramics are to be salvaged or disposed of, special precautions must be taken to protect personnel. All such personnel must be made aware of the deadly hazards involved and the necessity of great care and attention to safety precautions.

GLASS EXPLOSION
Every power tube is pumped to a very high vacuum, which, in some cases, is contained by a glass envelope. When handling glass tubes, remember that glass is a relatively fragile material, and accidental breakage can result at any time. Breakage can cause an explosion, which will result in an explosive scattering of flying glass particles and fragments. Serious personal injury can result. The larger the tube envelope, the greater the potential hazard. When handling such tubes, safety glasses (or even better, a face shield), heavy clothing and leather gloves should be worn for protection.

HOT WATER
EXTREME HEAT occurs in the anode portion of power tubes during operation. Water channels used for cooling also reach high temperatures (as high as boiling, 100°C or 212°F, or above) and the hot water is under pressure (sometimes as high as 100 PSI). A rupture of the water channel or other contact with hot portions of this tube could scald or burn. Take precautions to prevent and avoid such rupture or contact.

HOT SURFACES
The anode portion of power tubes is often air-cooled or conduction-cooled. The air cooled external surfaces normally operates at a high temperature (up to 200° to 300°C). Other portions of the tube also may reach high temperatures; especially the cathode insulator and the cathode/heater surfaces. All hot surfaces may remain hot for an extended time after the tube is shut off. To prevent serious burns, take care to prevent and avoid any bodily contact with these surfaces during and for a reasonable cool-down period after tube operation.

TUBE DISPOSAL
Tubes which contain BeO may be regulated as hazardous wastes. All tubes should be disposed of in accordance with applicable federal, state and local hazardous waste regulations. Contact CPV/EIMAC for further information.

49 CFR COMPLIANCE CERTIFICATION
This package conforms to the conditions and limitations specified in 49 CFR 173.424 for radioactive material, excepted package-instruments or article UN2910.