ESTABLISHED 1867

70-56

File 4

MALLINCKRODT CHEMICAL WORKS

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FINE CHEMICALS FOR MEDICINAL, PHOTOGRAPHIC
ANALYTICAL AND INDUSTRIAL PURPOSES

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DETROIT, LOS ANGELES, PHILADELPHIA, SAN FRANCISCO, MONTREAL, TORONTO

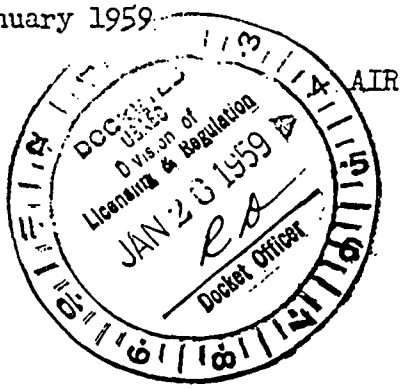
CABLE ADDRESSES
MALLINCKRODT ST. LOUIS
DESABRO NEW YORK
CODES
A B C FIFTH ED.
A B C SIXTH ED.
BENTLEY'S COMPLETE PHRASE
BENTLEY'S SECOND PHRASE

SECOND AVE. MALLINCKRODT STS. ST. LOUIS, 7, MO.

Mallinckrodt FINE CHEMICALS Standard Since 1867

22 January 1959

AIR MAIL



Mr. Lyall Johnson, Chief
Lincensing Branch
Div. of Licensing & Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Johnson:

We are attaching for your information and consideration additional detailed information of our high level monitoring system which we propose to install at our Hematite operations in accordance with the new 10 CFR Part 70 regulations. We are including a description of Nuclear Measurements alarm, Model GA-2, including circuit diagram and layout. We are also enclosing Drawings 3383-1 and 3383-6 showing details of the installation of the five GA-2 monitors showing, by shading, the plant areas covered by each monitor.

In calculations of the coverage, allowance was made for thickness and composition of the walls in the building. In order to secure coverage of the East storage vault, a special low gamma absorption window is being installed in our fire wall to extend the coverage to the end of the North portion of this storage vault.

We are also making provision in the initial installation for an additional monitor in the South end of the East production building, since it is anticipated that within the foreseeable future this end will also be utilized for nuclear work. At the present time, however, this section of the East building will be used only for storage of non-nuclear materials.

Drawing 3383-1 shows the location of eight horns, four inside the buildings and four outside the buildings. These will be Federal Model 55, low frequency resonating horns or equivalent. These horns will be actuated by the monitors and serve as the audible alarm. We are simultaneously installing a system of bells which will be used as a fire alarm to give us added safety protection.

We are proceeding with the purchase and installation of this equipment as shown on these drawings, including the establishment of an evacuation and shelter area in the available tile barn which will also be equipped with telephone, emergency equipment, and act as the emergency control center for the entire plant. Unless we hear from you contrariwise, we will presume that the system as proposed adequately meets the requirements of 10 CFR Part 70.

Very truly yours,
MALLINCKRODT NUCLEAR CORPORATION

E-128

W. M. Leaders
Technical Director

WML:dj

70-26

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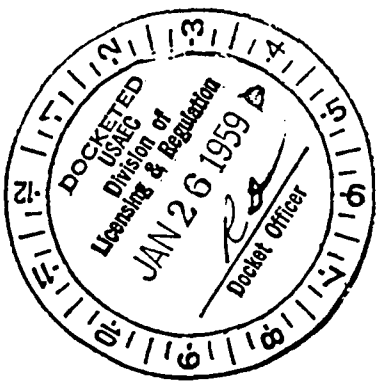


GAMMA ALARM SYSTEM

MODEL GA-2

General Description

The NMC Model GA-2 is a local-area continuous automatic alarm system sensitive to gamma radiation only.

It is designed for continuous operation under industrial conditions with an absolute minimum of attention. In addition, it is designed for simple installation and set-up. Adjusting the alarm and alert levels involves only setting the mechanical contactor on the meter for the desired levels.

Because both alert and alarm contacts are provided, it may be used either as a pre-alarm and alarm device or it may be used to indicate subnormal, normal and abnormal levels of gamma radiation.

The instrument is basically a scintillation counter in which the current from the photomultiplier rather than the pulse-rate from the photomultiplier is detected. Hence, the detected current is proportional to the energy of the incident radiation.

The non-linear incident energy-to-light-output ratio of the plastic phosphor is largely compensated by the use of an overside phosphor in which self-shielding for low energy emitters contrasts with total-volume sensitivity for high energy emitters.

By using a single logarithmic vacuum tube voltmeter, the current requirement from the photomultiplier tube remains below the level at which fatigue of the dynodes becomes evident.

Likewise, the alert and alarm contacts on the indicating meter are protected by interposing a cut-off vacuum tube and relay so that alarm system contact rated at 10 amperes results from the flow of 20 microamperes through the meter contacts. This has been the practice of NMC in all our monitoring devices and reliability and performance of this circuit has been eminently satisfactory.

The power supply of this instrument is based entirely upon a sola type 7104 magnetostatically regulated power transformer. Low voltage requirements are derived from this transformer in a half wave system using silicon rectifiers. High voltage is produced by voltage doubling and rectification with greatly derated Westinghouse selenium high voltage units. This, too, corresponds to a practice adopted two years ago by NMC and now well proved in the field for complete reliability.

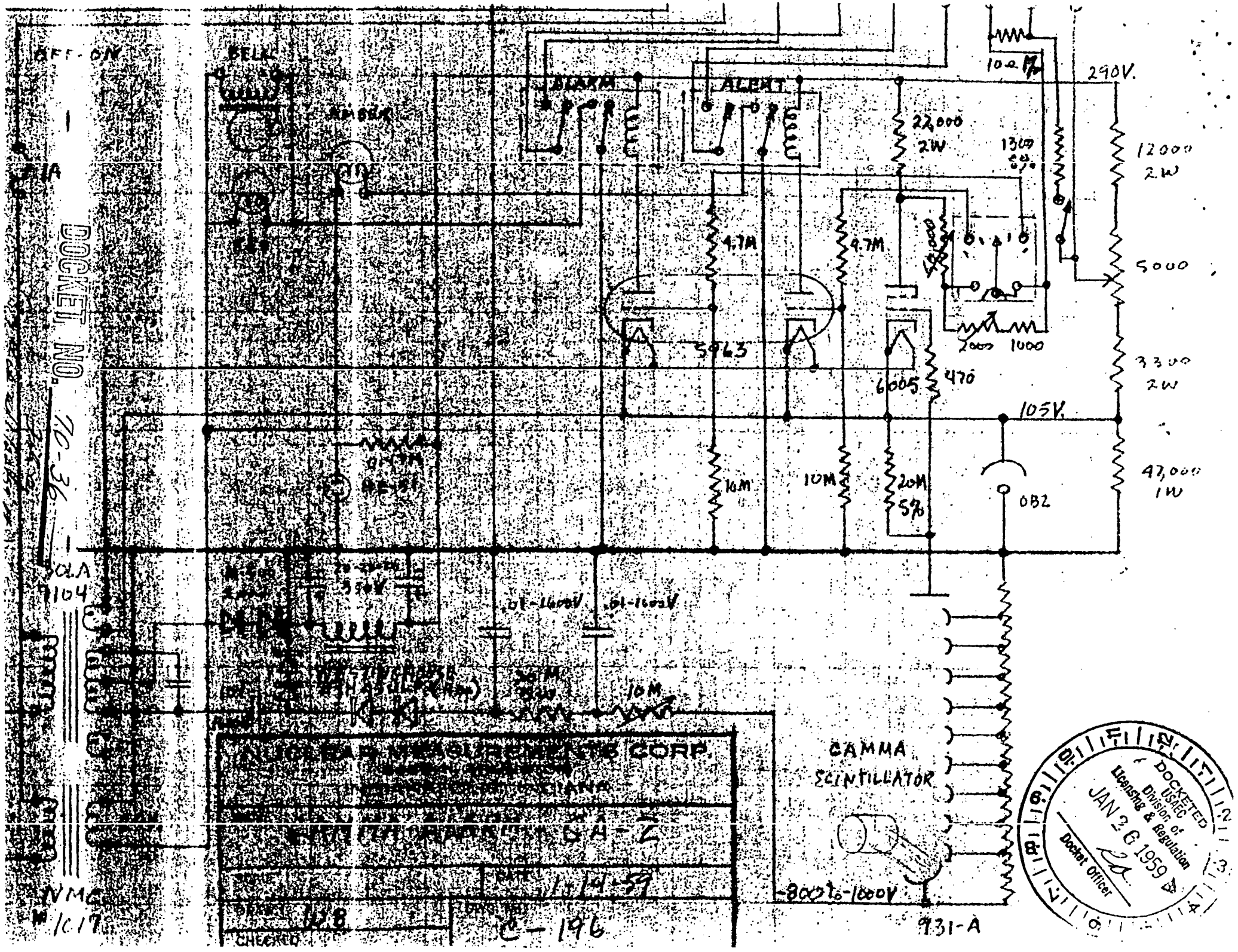
A bright amber light indicates the alert condition and a bright red lamp and loud bell indicates the alarm condition.

The instrument is housed in a heavy steel box provided with a sealed lid and two gasketed bushings for electrical service.

A ten point terminal block provides for 60 cycle 90 to 130 volt single phase AC current with a maximum requirement of 0.5 amps. Terminals 4 and 5 provide for an external alarm circuit, 10 amp, 115 Volt AC normally open contacts. Terminals 6 and 7 provide the alert switch contacts with the same rating as alarm. Terminals 8 and 9 provide for a 0 to 10 mv electronic recorder and, terminals 9 and 10 provide for 0 to 1 ma D'Arsonval type graphic recorder such as the Esterline-Angus AW series.

Low and high range trimming controls and a calibrating control are accessible by removing hole plugs from the three small access ports in the panel.

The entire panel with the operating circuit intact may be removed by disconnecting the 10 wires from the terminal strip and removal of two screws. For normal service and inspection purposes, two screws are removed from the box cover and the cover drops down to a 90° position exposing the entire operating circuit.


OFF-ON
BELL
ALARM
ALERT
290V.
22,000 2W
1300
12000 2W
5000
3300 2W
47,000 1W
105V.
4.7M
9.7M
5963
6005
470
2000
1000
16M
10M
20M 5%
OB2
CAMMA SCINTILLATOR
-800 to -1000V
931-A
NUCLEAR MEASUREMENTS CORP.
DRAWN
DATE 1-14-59
CHECKED
DOCKETED USAEC Division of Licensing & Regulation JAN 26 1959
Docket Officer
DOCKET NO. 70-36
NMC

Docket No. 70-36

January 26, 1959

NOTICE TO PUBLIC DOCUMENT ROOM & FILES

Drawings 3383-1 and 3383-6, transmitted with Mallinckrodt Nuclear Corp., letter of January 22, 1959, are being withheld subject to review in accordance with Section 2.790 of Part 2, Title 10, CFR - "Public Inspection, Exceptions, Requests for Withholding". withdrawn

The following enclosures transmitted with letter above will be sent as soon as they are available:

Drawing No. D-170 and C-196

One page entitled "Specification Sheet - Gamma Alarm Model GA-2," dtd. Jan. 16/59.