



**AccuRay**\*

# BETA GAUGES

Here's What the AccuRay Gives You—

- IMPROVED QUALITY CONTROL
- MATERIAL SAVINGS
- IMPROVED MOISTURE CONTROL
- ELIMINATION OF BASIS WEIGHT SAMPLING
- QUICK SPECIFICATION CHANGES
- FASTER START UP TIME
- PERMANENT PERFORMANCE RECORD
- INCREASED ENGINEERING EFFICIENCY
- BETTER PRODUCTION CONTROL
- EFFECTIVE SALES TOOL

PAPER — PAPERBOARD — BOXBOARD — COATED STOCK

for the **PAPER INDUSTRY**

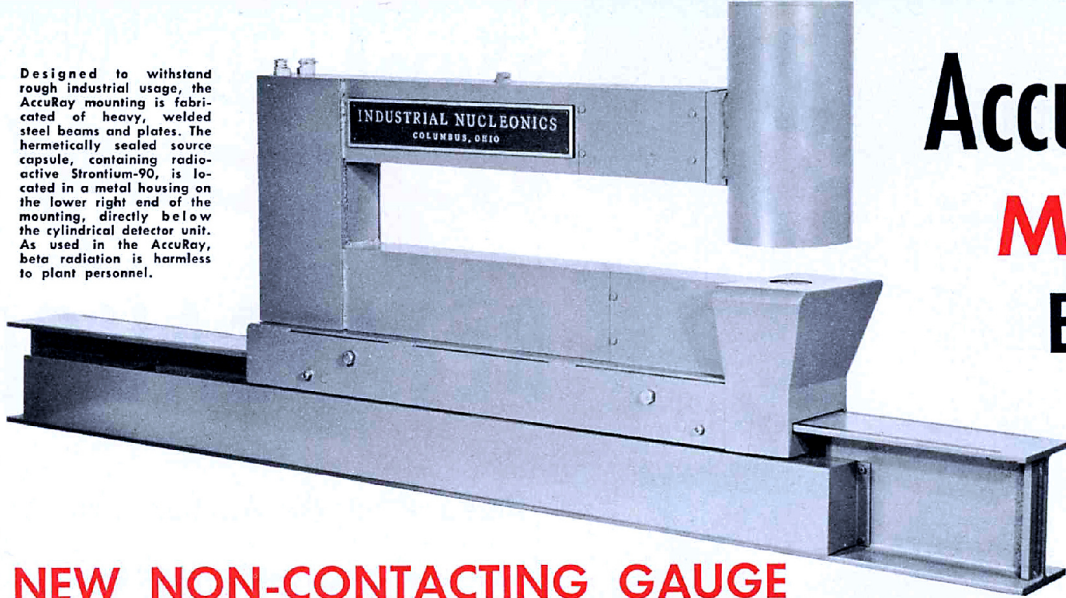
*Nuclear Controls And Measurements For Industry*

**INDUSTRIAL NUCLEONICS CORPORATION**

Columbus, Ohio



Designed to withstand rough industrial usage, the AccuRay mounting is fabricated of heavy, welded steel beams and plates. The hermetically sealed source capsule, containing radioactive Strontium-90, is located in a metal housing on the lower right end of the mounting, directly below the cylindrical detector unit. As used in the AccuRay, beta radiation is harmless to plant personnel.



# AccuRay

## Measu

## BASIS

## NEW NON-CONTACTING GAUGE GIVES YOU MEASUREMENTS ACROSS WIDTH OF SHEET!

With the AccuRay it is possible for the first time to secure continuous, accurate basis weight readings across the width of the sheet. This feature of the AccuRay enables you to determine the exact variation in basis weight of all points on the sheet, providing the information so necessary for you to improve the quality of your product.

Now, for the first time, each adjustment to the paper machine which affects the basis weight of the run is pictured clearly and continuously for operating personnel. Action can be taken immediately to correct off-specification material and changes in formation the very moment these fluctuations are reflected on the chart. Thus, the AccuRay acts as the "pulse" of the paper making process, continuously indicating safe, normal operation or spotlighting errors instantly.

In addition to being a production tool, the AccuRay provides a Measurement Standard that can be used advantageously by almost all functions of your business. Each AccuRay chart presents a detailed history of the material processed—it shows exact basis weight of the run, high and low tolerance lines, speed of sheet, position of the gauge on sheet, machine down time, "spec" number, shift number, time and date.

This recorded information of every minute of production time is invaluable to Production, Engineering, Process Development, Quality Control, Cost Accounting, Purchasing, Sales, and Advertising departments. With such information available, management can provide a continuity of planning and action in producing a higher quality product at less expense. Only the Industrial Nucleonics AccuRay with its 100% reliability and amazing accuracy can give you this Measurement Standard.

## How An AccuRay Installation Pays Off for You . . .

### IMPROVED QUALITY CONTROL

The ability of the AccuRay to give you a continuous, accurate picture of basis weight enables you to get on specification quickly and stay on. Variations in weight both along and across the sheet are charted instantly and clearly, indicating to the operators the type and degree of corrective machine adjustments necessary to produce sheet uniformity.

### MATERIAL SAVINGS

Weight variations due to an increase or decrease in pulp content can be "pin pointed" by the AccuRay. Experience has shown that operators quickly learn to recognize and adjust for heavy pulp content, producing pulp savings in heavier stocks ample to amortize the gauge in a short period of time.

### IMPROVED MOISTURE CONTROL

Because moisture variations show up on the AccuRay chart as increases or decreases in basis weight, skilled machine operators can regulate water content to assure constantly the maximum amount of moisture to pulp in the final product.

### ELIMINATION OF BASIS WEIGHT SAMPLING

The expense of cutting and weighing samples to determine basis weight is eliminated completely by the AccuRay.

### QUICK SPECIFICATION CHANGES

Changes from one specification to another can be made much faster through use of the AccuRay. Using the chart as a guide, the operator can regulate the rate and degree of change quickly. He knows exactly when he "hits" his new specification. In some instances, as much as 15 minutes has been cut from the average time of changing specifications.

### FASTER START UP TIME

When starting operations, machine operators find the profile sheet readings extremely valuable in making correct, fast adjustments for sheet uniformity. By observing the AccuRay chart, they eliminate searching and know immediately when specification is reached.

### PERMANENT PERFORMANCE RECORD

A permanent record of each tour's performance is provided by the AccuRay. This enables management to compare the operating effectiveness of their personnel and accurately check results of day and night shifts. The AccuRay also is valuable in the training and evaluating of new employees.

### INCREASED ENGINEERING EFFICIENCY

The AccuRay provides a daily record that can be used to analyze the condition of your processing equipment. The gauge is capable of giving an immediate warning of equipment failure or process trouble. Effectiveness of repair and replacement parts also can be determined in many cases.

### BETTER PRODUCTION CONTROL

The AccuRay records and helps to maintain a constant and definite cost of material throughout an entire run. It provides an excellent means of checking efficiency because it presents accurate recordings of basis weight, length of run, and time consumed. All down time of equipment and process is charted.

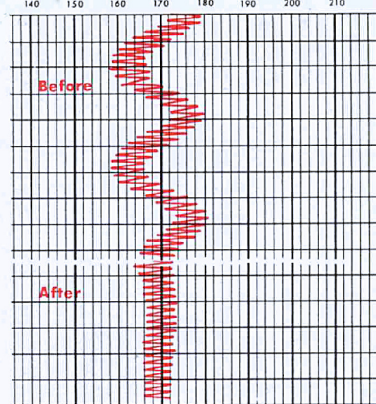
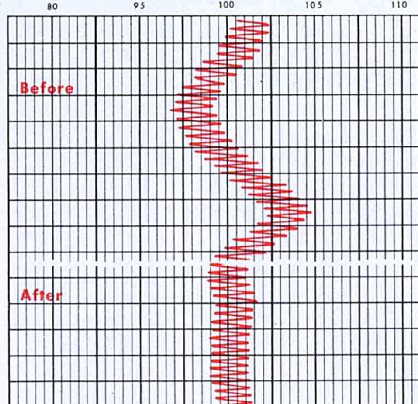
### EFFECTIVE SALES TOOL

Copies of charts of actual production runs can be attached to rolls or bundles to give customers definite proof of "on specification" material. Customers accept charts as evidence of company's intentions to provide them with guaranteed area check.



# Beta Gauge es Directly WEIGHT

with an accuracy  
of better than  
**1%**  
**ONE PERCENT**



Typical of the basis weight problems discovered by the AccuRay are the two traces shown above. The curved trace, top left, was the result of a faulty steam control mechanism that alternately raised and lowered pressure in the drying rolls. This caused the basis weight to grow heavy and light according to the amount of moisture remaining in the paper. The stock was 100-pound kraft, shown on a chart scaled from 75 to 125 pounds, each small division representing  $\frac{1}{2}$  pound. Weight variations were as much as 10 pounds. From the trace, operators were able to locate the trouble and correct to the straight trace shown below.

The curved trace, top right, was discovered to be a variation in pulp content, caused by a surging effect in the stuff box. This was 170-pound board shown on a chart scaled from 100 to 300 pounds, each small division representing 20 pounds as shown. From the trace, operators secured information to locate the source of the trouble and correct to the straight trace shown below. After short experience with the gauge, operators quickly can tell from the type of trace the exact corrections to be made.

## CHECK THESE ACCURAY FEATURES

1. Direct, continuous readings. 2. Measurement accuracy of 1%. 3. Completely automatic standardization. 4. Original calibration handles all weight ranges. 5. Gauge does not contact material. 6. Automatic traversing across sheet. 7. Rugged industrial design. 8. Simple, non-technical operation. 9. Instantaneous response. 10. Adaptable accessories for your own needs.

- THE ACCURAY WILL SHUT ITSELF OFF IF DAMAGED— PREVENTING INCORRECT READINGS! •

## What Automatic Standardization Means

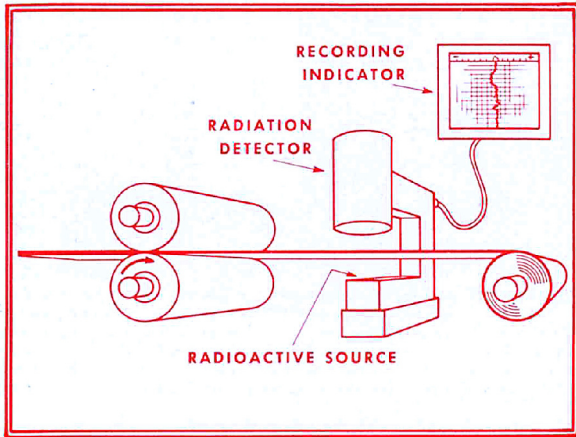
The AccuRay is completely automatic in operation and requires no attention on the part of the machine operator or foreman for calibration or standardization. Compensation for variables such as source decay, change in characteristics of electronic components, changes in weight of air column between the source and detector because of variations in temperature, pressure, or humidity, and changes resulting from the accumulation of dirt on the source and detector housings—compensation for all these variables is automatically carried out by the gauge every 30 minutes. This eliminates the possibility of human error inherent in other instrumentation that requires manual "tweaking" of knobs and insertions of samples every few hours to maintain calibration.

The strongly constructed console of the Model R-D is fabricated of 14 gauge steel and furnished in smooth, grey baked enamel. It houses and protects a recorder, automatic standardizing equipment, indicator and operating panels, plus other circuitry. The Gauge is calibrated in accordance with the weight ranges specified by the customer and these ranges are indicated on the recorder scale.





# HOW THE AccuRay WORKS



Simplified Diagram of Beta Gauge Principles

## RUGGED MECHANICAL and ELECTRONIC CONSTRUCTION

Of extremely rugged construction, the U-mount is fabricated of welded, heavy steel beams and plates. This sturdy mounting is furnished to assure accurate readings even when much vibration is present or in the event that the upper arm of the mount is temporarily loaded. The source-detector unit is available in lengths permitting measurements any desired distance, from the edge of the sheet; depending on your specifications. To fulfill industrial requirements including stability under severe conditions of moisture, corrosive atmospheres, vibration, and rough handling, both the source-detector unit and console are designed with liberal safety margins to provide the necessary strength. Electronic components in the circuitry are sufficiently rugged to absorb severe shocks without damage.

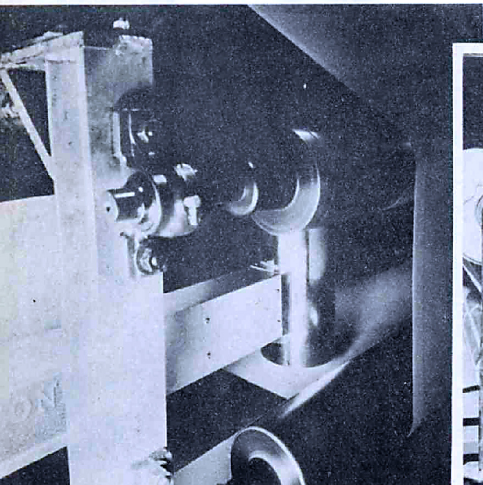
## THEORY OF OPERATION

Operation of the gauge is basically simple. The main components of the gauge are a source of beta radiation, a detector of radiation, and an indicating or recording device. As the material being measured is run through a gap between the source and detector, the amount of radiation passing through the material to the detector varies according to the weight of the material. These variations in the amount of radiation passing through the material are measured by the detector unit and expressed on the recording device directly in terms of basis weight. Such material variations as color, moisture content, and composition will in no way affect the accuracy of the AccuRay readings because beta ray absorption is primarily a function of the weight per unit area of the material through which the rays pass, rather than being dependent upon the chemical composition of material. Variations in composition or added moisture will affect the reading of the gauge only in proportion to the unit weight which they contribute to the material being measured. Also, the beta rays themselves will in no way affect measured material.

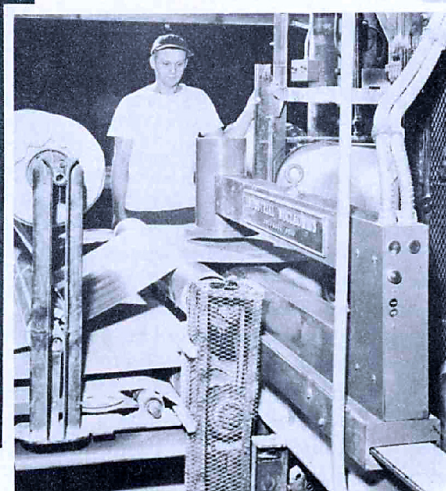
## SOURCE-DETECTOR UNIT

The source-detector unit is U-shaped with the source and detector mounted on the open ends of the U, directly opposite each other. A radioactive substance, Strontium-90, produced under the direction of the U. S. Atomic Energy Commission at Oak Ridge, is contained in a hermetically sealed capsule and mounted inside a cast metal box on the lower arm of the U. The source capsule, developed for Industrial Nucleonics Corporation by Battelle Memorial Institute, is fabricated in such a way that, for all practical purposes, it is impossible to break open. An electrically-actuated shutter is provided to cover the source when the gauge is not measuring or when it is desired to clean the source-detector unit. A pilot light on the U-mount indicates when the source shutter is in open position. The radioactive Strontium-90 has a rated active life of 30 years.

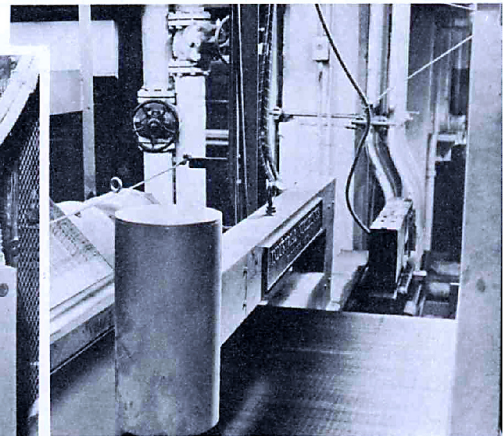
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