



October 6, 1999

99E-036 (61)

Mr. Kenneth N. Weinstein  
Associate Administrator for Safety Assurance  
National Highway Traffic Safety Administration  
400 7<sup>th</sup> Street, SW  
Washington, DC 20590

Dear Mr. Weinstein:

Norcold Inc., 600 S. Kuther Rd., Sidney, Ohio 45365 (Phone 937-497-3080, Fax 937-497-3167) manufactures combination gas/electric absorption refrigerators which are sold for application in recreational vehicles (RVs) and camping trailers.

We have determined that a defect related to motor vehicle safety exists in a brass swivel nut which is an integral connection component of a pressure tap device in refrigerators supplied by Norcold to manufacturers of RVs and camping trailers. This pressure tap and its element, the brass swivel nut, is a component manufactured by Dayco Products Inc., One Prestige Place, Dayton, Ohio, 45401, a subsidiary of Mark IV Industries. It was sold to Norcold through an independent distribution company, Gateway Supply Co., Inc., 329 East Poplar Street, Sidney, Ohio 45365. The subject tap is an integral device in our gas control chain between our gas burner and main controls on product models 322, 323, N260, N260.3, N300 and N300.3. Prints of the device as configured in these models are attached along with a chronology of events leading to our decision of this notification.

As presently understood, the nature of defect existing in the swivel nut is described as "stress corrosion cracking", a phenomenon which can occur in metals given the conditions of a sustained tensile stress in the material and corrosion on the surface of the material created by certain chemical substances. The design of the nut and its assembly to the pressure tap component by its manufacturer requires a crimping operation that bends the brass around its mating part and hence introduces high tensile stress. At this time the precise chemical substance which acts in combination with the tensile strength to bring about stress corrosion cracking is under investigation. The environment in which an RV or trailer operates can supply possible corrosive agents such as products of combustion from vehicle exhausts, acid rain, spray from wet roads, salt spray atmospheres near oceans or even moisture from condensation. Based upon investigation, corrosion from environmental conditions alone, without the presence of stresses, does not create a failure of the component.

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The consequence of stress corrosion cracking observed can lead to an open fracture in the brass nut. If the nut is cracked severely enough to relax the flare joint between the aluminum gas line tube and the pressure tap component, propane fuel gas has the potential to leak only if the refrigerator is activated for operation on gas mode. A leakage of gas can present a potential for a fire to occur in the area behind the refrigerator if the leakage and accumulation is substantial enough to ignite from our adjacent burner. Vehicle designs incorporate vent openings to allow dissipation of gases. A warning preceding any possible ignition would be the smell of propane gas.

Refrigerator operations on the electrical AC or DC power modes, which is most common use, would not permit a gas leak to occur if the conditions of a faulty nut were present. As such, electrical operation of the refrigerator presents no potential hazards.

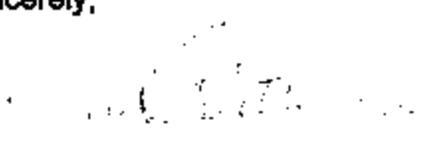
A total population of 117,793 units of the model 322/323 were produced and sold between the period of August 1992 and August 15, 1999. In addition, 9,242 units of models N260, N260.3, N300 and N300.3 were produced and sold between April 1998 and August 26, 1999. These combined 127,035 units all incorporated the pressure tap with the suspect swivel nut. To date about 0.06% of the units have been identified as displaying a fault in the nut.

We are planning a campaign to notify OEMs, dealers and vehicle owners of the availability of a free replacement kit for the exchange of this suspect component. As soon as the details are complete, we will submit the plan to you along with the other appropriate information needed to comply with NHTSA defect notification.

Our remedy is to replace the defective pressure tap and connecting gas line with an alternative assembly. We expect to have parts available for replacement work to begin early November and will begin our public campaign of notifying appropriate customers the week of October 11, 1999. Direct notification to vehicle owners will be assisted by any information available from OEMs and dealers.

Please assign an NHTSA identification number for our use and advise of any questions regarding our above notification.

Sincerely,



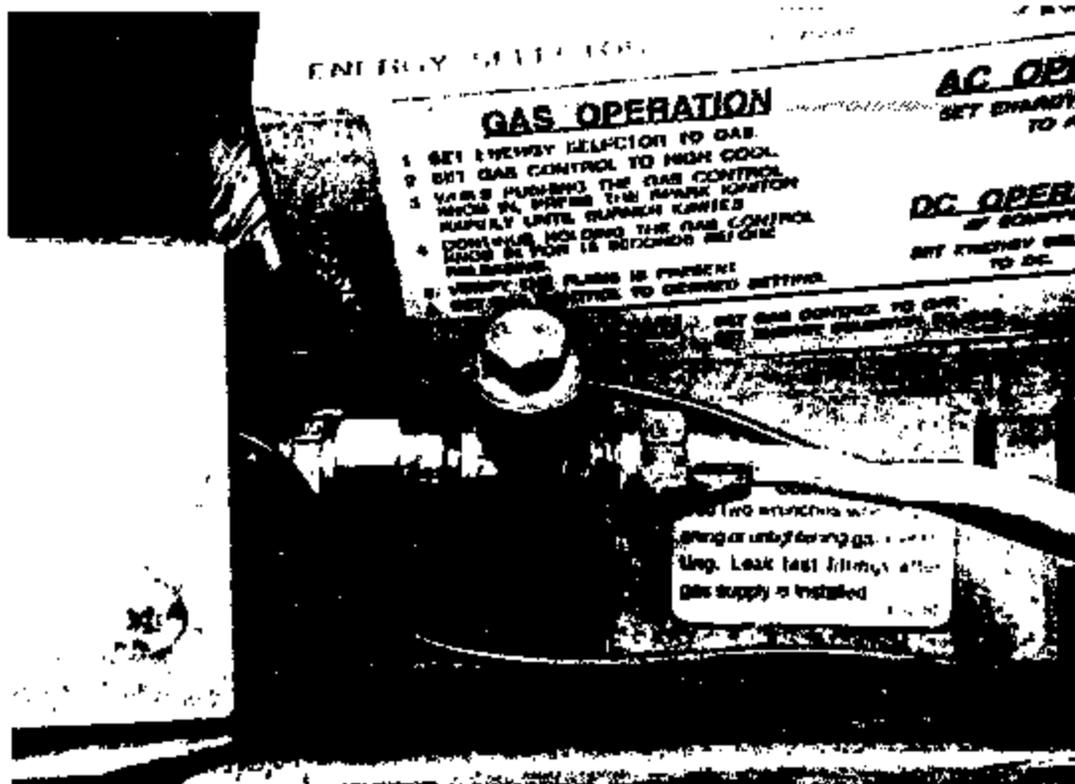
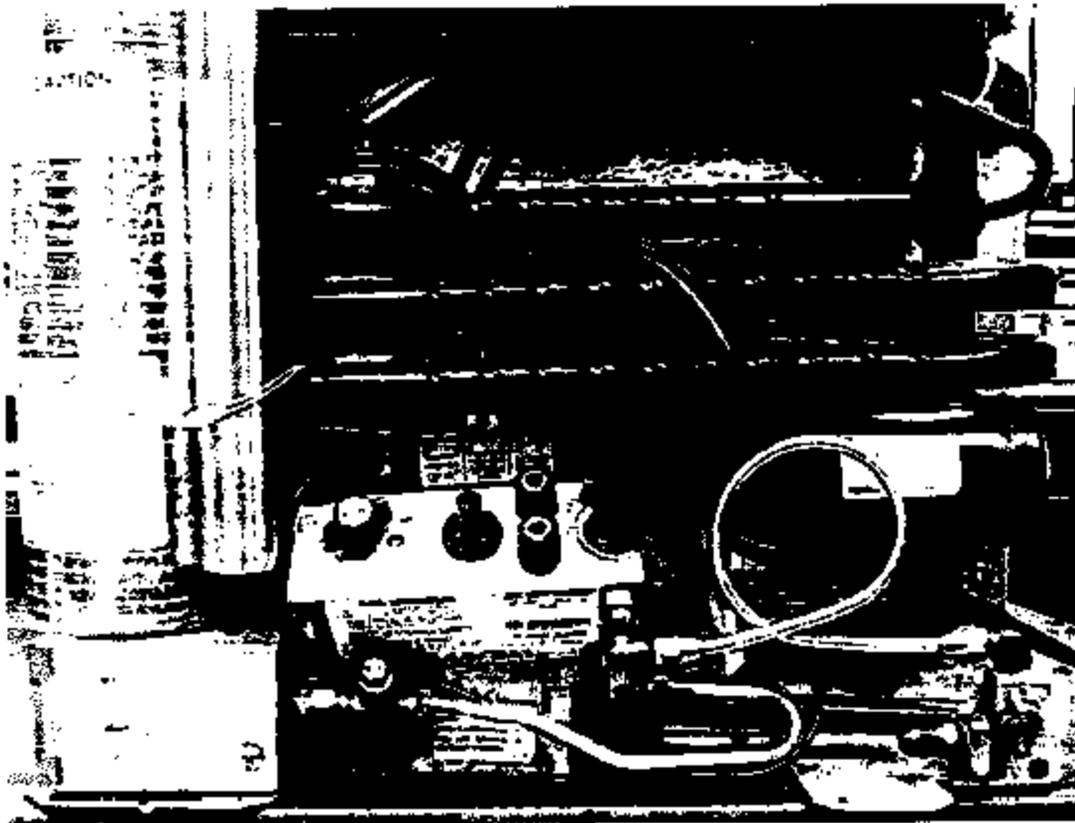
Ronald L. Riethman  
President

## Pressure Tap Tee Chronology

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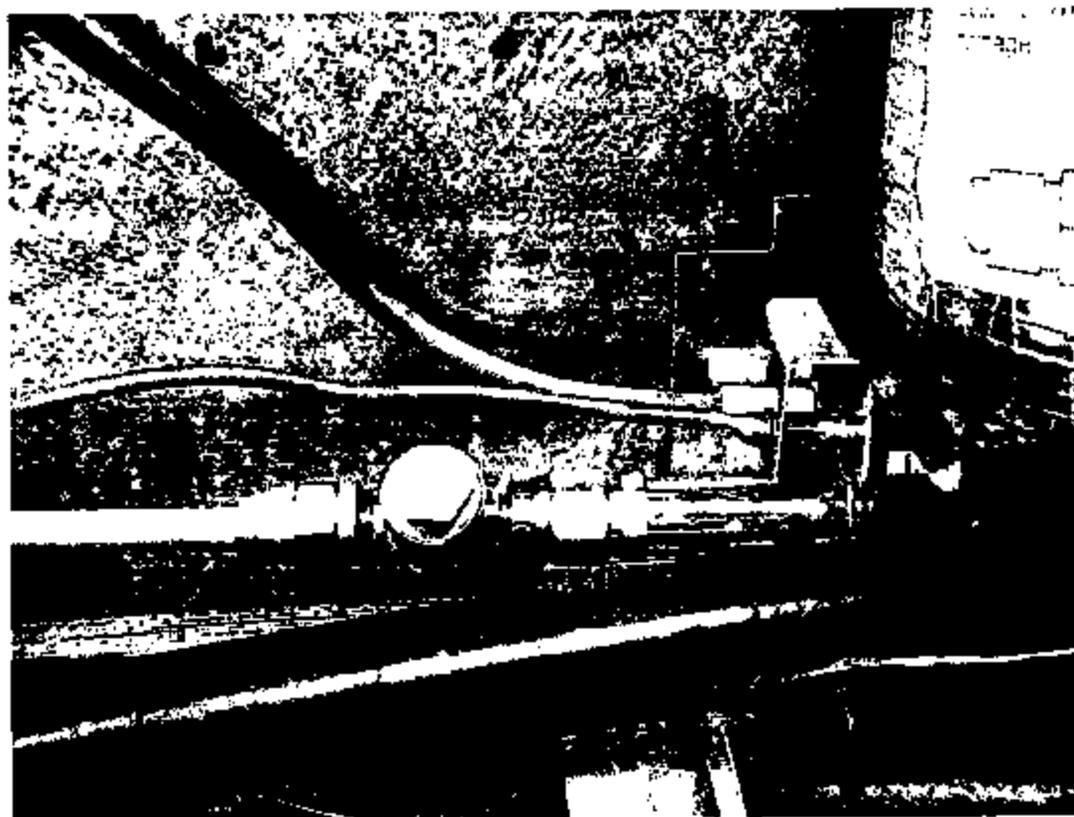
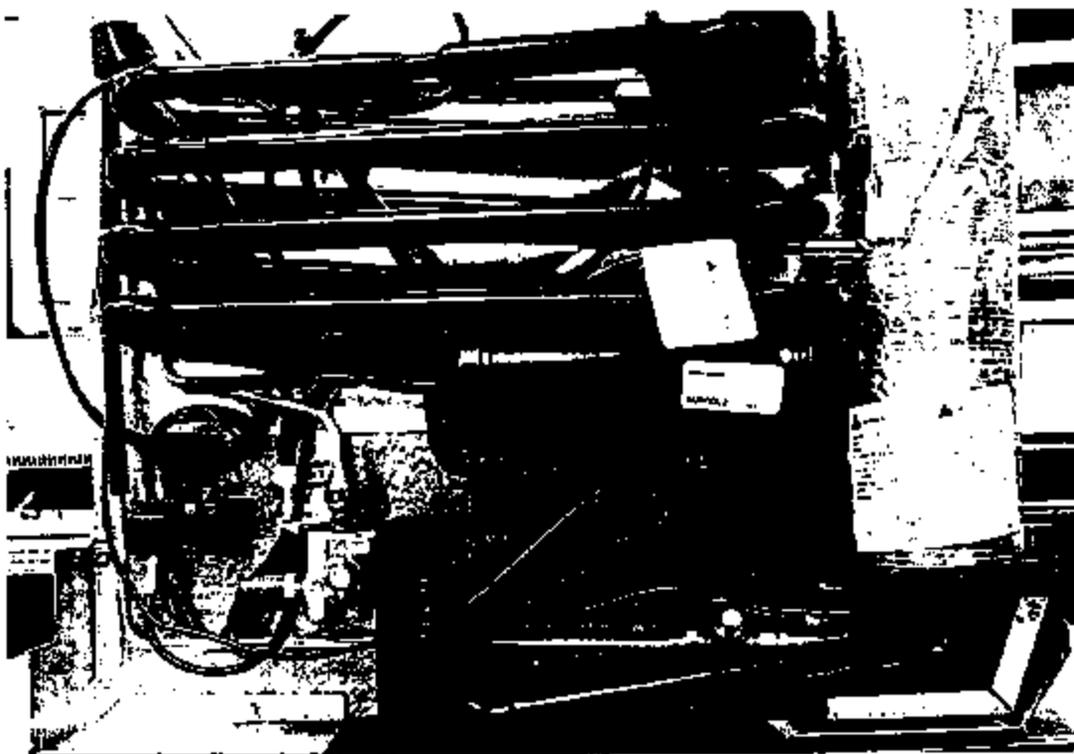
- 1992 Production starts on 322/323 refrigerators using Norcold part no. 61755322 pressure tap tee with swivel flare nut.
- 6/1998 Production begins on N260 and N300 model refrigerators, both using pressure tap tee #61755322.
- Summer 1998 Two cracked flare nuts returned from field through Norcold service organization. The cracks are completely through the body of the nuts. One is sent to a local lab for analysis. Verbal report said cause of cracking was overtightening.
- 8/3/98 Response from Gateway Supply (our source for the part) to inquiry about the nut failure. Gives swivel nut material spec as UNSC3600 free cutting half hard brass which is very common basic material referenced in SAE J513 spec. The part manufacturer, Dayco Eastman, advised them that "Apparently this cracking was a random problem..."
- ~ 7/8/99 Norcold customer service department receives five cracked flare nuts on pressure tap fittings from 322/323. These are customer returns from the field and come from 3 dealers in one geographical area and all from one brand of trailer. All 5 parts are sent to an outside laboratory for failure analysis.
- 7/8/99 Another cracked nut is returned from one of the same dealers in the field.
- 7/15/99 Engineering work begins to eliminate the tee with the cracking nut from products in production. Communication begins with part manufacturer to investigate the problem.
- 7/21/99 A-Lab report received saying cracks in nuts are from stress corrosion cracking which is caused by the 1) brass material 2) being exposed in the environment to a corrosive agent 3) in the presence of tensile stress from swaging and tightening. Oxygen and carbon were found in the corrosion product. A weak acid (carbonic?) named as possible cause. Automotive exhaust, road salt and rain water mentioned as possible sources of the corrosive contaminant.
- 7/23/99 Tee with cracked nut is tested on 323 for leak and ability to support fire. Nut leaks and will support fire when lit by hand.
- 7/26/99 Service records searched: Ten warranty claims since 1992 have used pressure tap tee as replacement part. Info from service shows shipments of subject tee to our entire distribution system to be 1 (1993), 5 (1994), 8 (1995), 12 (1996), 38 (1997), 67 (1998), 71 (1999 through 7/26) for total of 202. No data exists on how many of these have been used in field repair versus those held in stock by distributors. Total use of subject tee to date is over 125,000.
- 7/27/99 Sent 20 tees removed from recon 323s to A-Lab for analysis.

- 7/28/99 Received fax from A-Lab that 4 of 20 pieces have cracks visible before testing.
- 7/28/99 Seven parts sent to Dayco for their lab to analyze.
- 8/1/99 More lab work done and field visits made by Norcold personnel. First parts sent University of Dayton Research Institute (UDRI) for second opinion. Bubble leak checking solutions collected and investigated. No specific chemical cause for the corrosion is identified.
- 8/8/99 Lab report from A-Lab on second set of parts says "Contaminants of sulfur, chlorides, phosphates, magnesium, sodium, potassium calcium and silicon indicates a water borne corrosive agent ..."
- 8/10/99 Dayco's lab (TSL) confirms stress corrosion cracking occurring.
- 8/15/99 Production of models 322 & 323 begins without incorporating tee # 617553 starting with serial no. 734882.
- 8/18/99 First report from UDRI confirms corrosion present in cracked part. Elemental analysis shows carbon, oxygen, sodium and sulfur as the primary contaminants.
- 8/18/99 Field failure reports (still all from same 3 dealers in Ohio and Pennsylvania) have now reached 18 incidents. A review meeting was held to determine if any unique factors causing isolation of incidents could be identified.
- 8/24/99 Production of model N260 begins without incorporating tee # 617553 starting with serial no. 738527.
- 8/24/99 Production of models N300 begins without incorporating tee # 617553 starting with serial no. 738626.
- 8/30/99 Decision reached to visit about 30 camper dealerships to see if their service departments have experienced any issues on our gas controls. No dealers reported or expressed concerns or issues.
- 9/2/99 Decision to try to collect field examples of used pressure tap tee locally and across USA by visiting local campgrounds, contacting local owners directly and visiting dealer lots. Initial results produce few parts. Efforts expanded, producing 82 components spanning 10 states coast to coast and 7 years of manufacture. 12 parts showed cracks visible to the naked eye. Laboratory analysis is continuing on this lot of parts.



N300

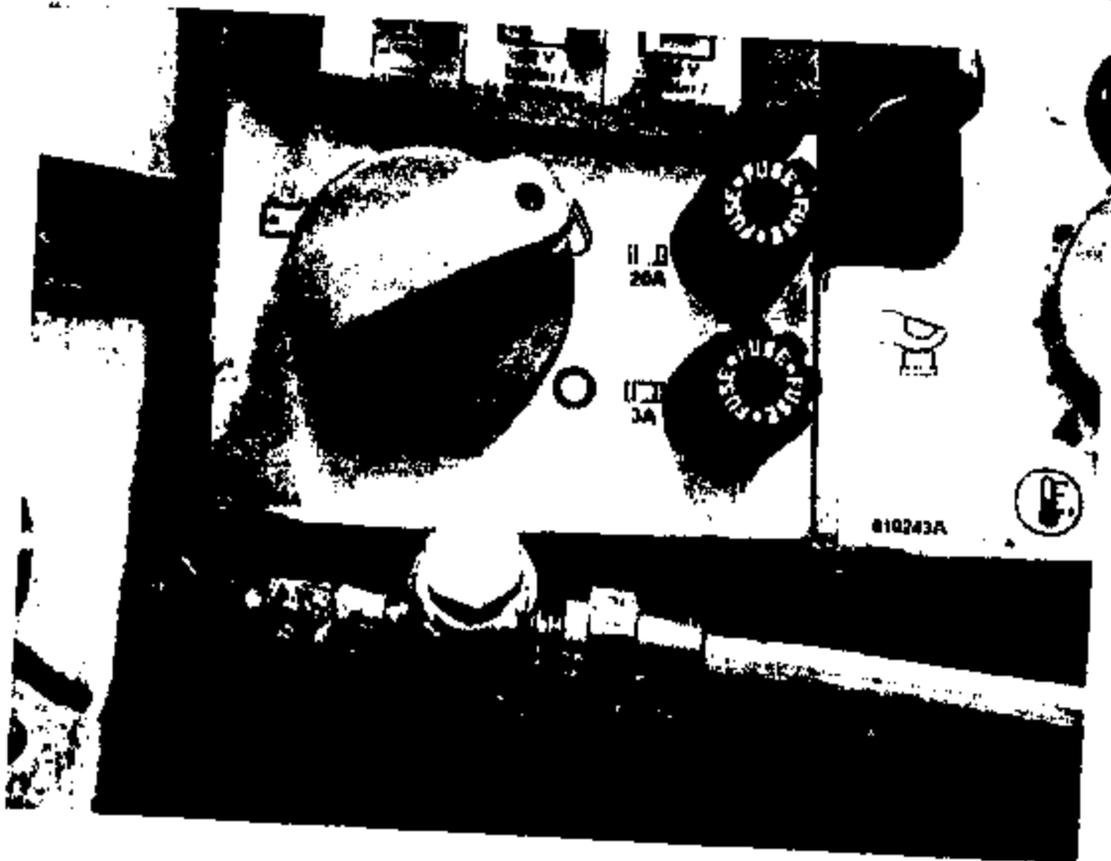
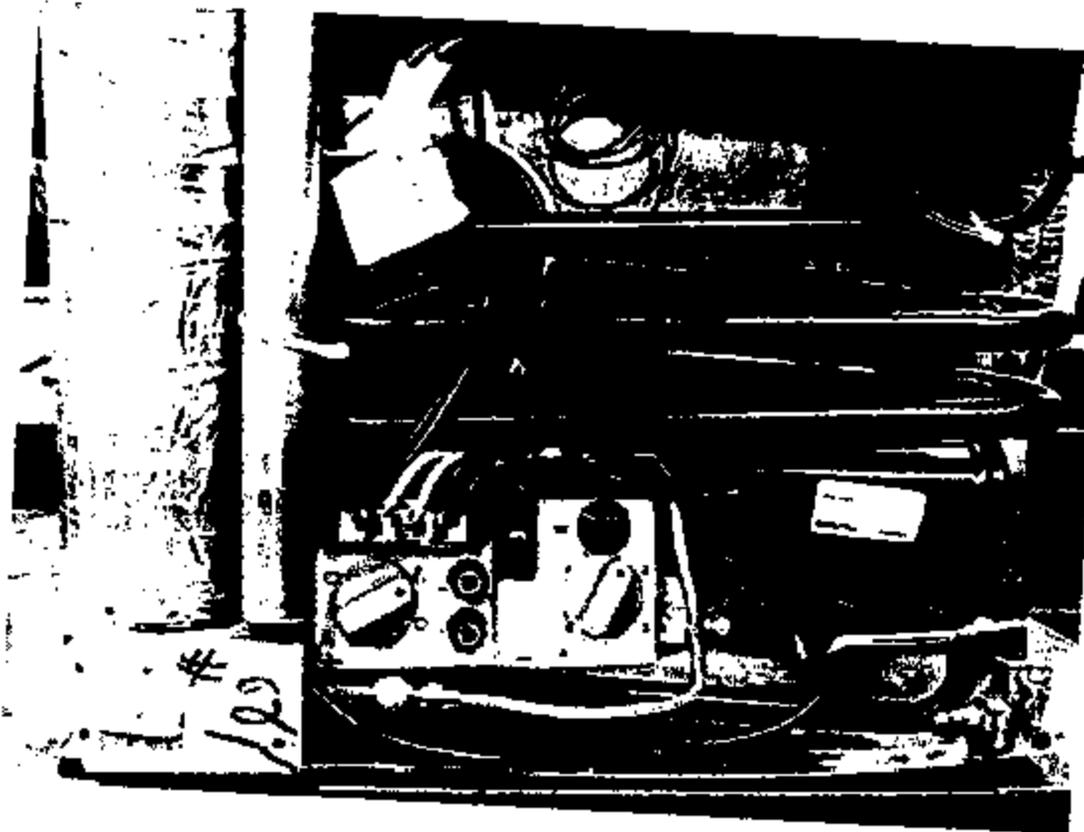
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N260

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September 28, 1999

