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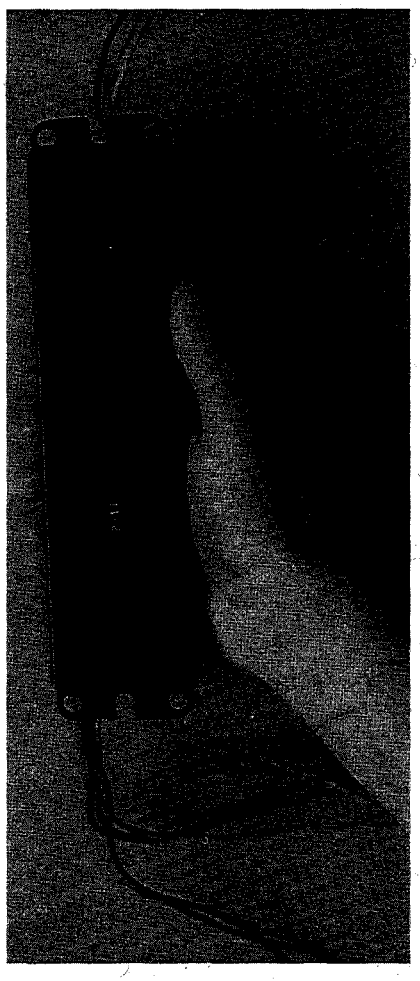

Identification of Lamp Ballasts Containing PCBs

Report EPS 2/CC/2
(revised)
August 1991

Canada

Environment Canada Environnement Canada

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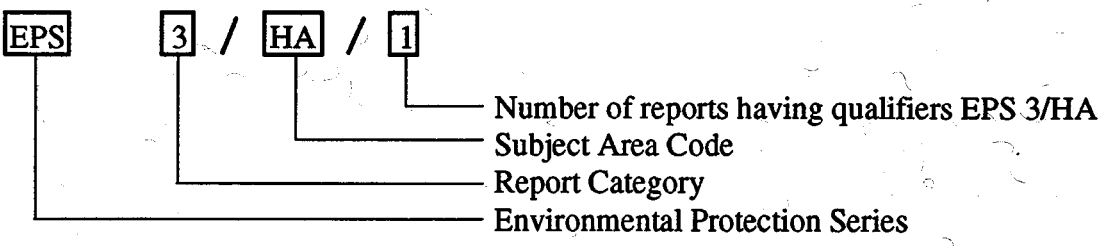

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Commercial Chemicals Branch
Environment Canada

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Abstract

Information was collected on the operation, construction, identification, storage and disposal of lamp ballasts. Particular attention was given to identifying lamp ballasts that could contain PCB-filled capacitors.

Résumé

On a recueilli des renseignements sur le fonctionnement, la constitution, l'identification, le stockage et l'élimination des ballasts de lampes. Une attention particulière a été portée à l'identification des ballasts dont les condensateurs contiennent des BPC.

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List of Photographs

Section 1

Introduction

Public concern has been growing about the use of polychlorinated biphenyls (PCBs) in commercial products. Lamp ballast capacitors are among some of the products that may contain PCBs. Inquiries from government agencies (federal, provincial, and municipal), industry, and the public have increased with the growing knowledge that PCBs are in such widespread use. Inevitably, the inquiries concern: the potential for PCB leakage from ballast capacitors; the risk of heating and exploding; how to identify a ballast that contains PCBs; and, of course, the potential risk to human health.

To answer these questions, Environment Canada conducted a study concerning the identification of ballasts containing PCB-filled capacitors; domestic and foreign manufacturers of PCB-containing ballasts; the total quantity of PCBs in use in ballasts; and any potential problems. This study does not address the actual or potential risk to human health arising from the use of PCB-ballasts in fluorescent lamps since this is within the mandate of Health and Welfare Canada.

The study was undertaken by the Commercial Chemicals Branch of Conservation and Protection, which is responsible for enforcing the *Canadian Environmental Protection Act* (CEPA) and the regulations and interim orders developed under the Act that pertain to commercial chemicals.

Section 2

Ballast Use and Location

Fluorescent and High Intensity Discharge (HID) lamps require ballasts. A ballast is designed to maintain a constant current through it, despite variations in applied voltage or changes in the rest of the circuit. As current passing through the ballast increases, the ballast increases in impedance; likewise the ballast decreases in impedance as the current passing through it decreases. The ballast acts, therefore, as a variable load on the system, differing from "load resistors" which have a constant resistance. The required ballast action is obtained by using a reactive and capacitive component to limit the lamp current. Any increase in the current passing through the ballast causes an increase in the temperature which results in a slight increase in resistance and reduces the current.

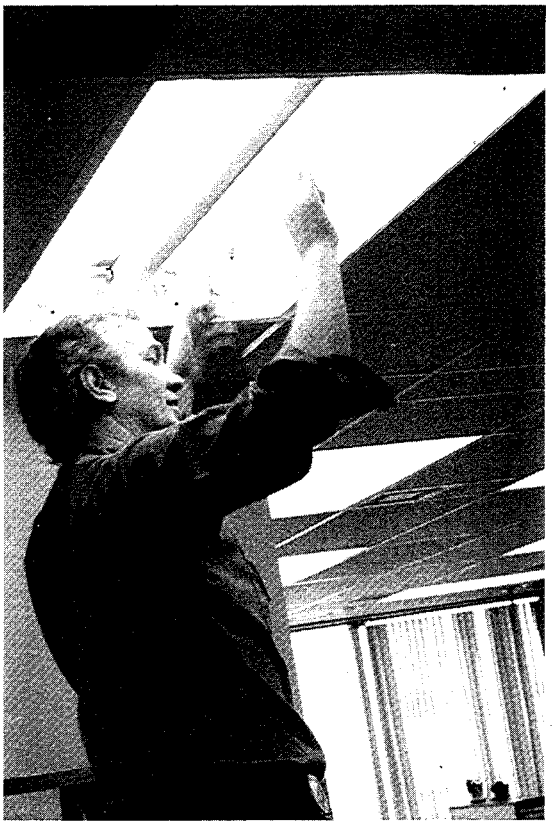
Ballasts are used to compensate for any variations in the line voltage or to compensate for negative volt-ampere characteristics of other devices, such as fluorescent lamps and other vapour lamps. Ballasts permit the economical dimming and flashing of rapid-start lamps, providing a range of applications and control not possible with previous lamp types. These rapid-start lamps are commonly used in flashing signs, and in residential and commercial lighting where continuously variable illumination levels are desired.

2.1 Fluorescent Lamp Ballasts

There are several different types of fluorescent lamp ballasts. The most common is the rapid-start ballast used to operate two, four-foot fluorescent lamps. Fluorescent lamp ballasts are usually mounted between the fluorescent tubes on the light fixture and are shielded with a metal protective device which reduces heat radiation (Photo 1).

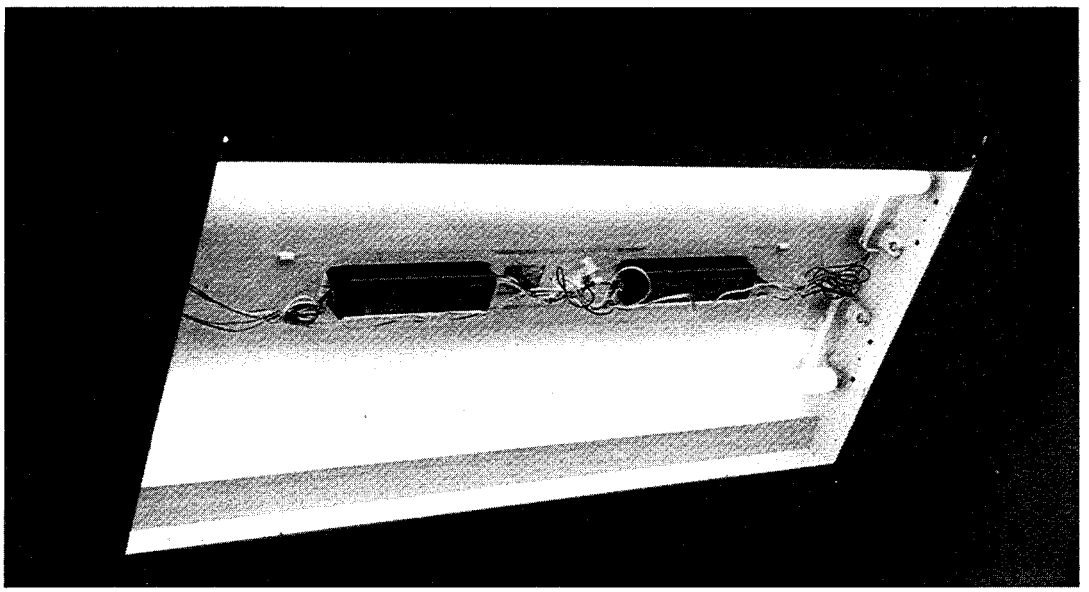
2.2 High Intensity Discharge (HID) Lamp Ballasts

High Intensity Discharge (HID) lamps differ in appearance from fluorescent lamps but have similar electrical characteristics and require ballasts for starting and controlling the lamp circuit. The main types of HID lamps are mercury, metal halide, and high-pressure sodium. High Intensity Discharge ballasts can be found both outdoors (e.g., in streetlamps) and indoors (e.g., in indoor parking garages). The ballast is either enclosed in its own box and fastened to the outside of the light fixture or located inside the light housing.



1a. The fluorescent tubes on both sides of the heat shield are removed for access to the ballasts.

1b. The heat shield is removed, exposing the lamp ballasts.



1c. Exposed lamp ballasts.

Photo 1 Fluorescent Lamp Unit

Section 3

Description of Ballasts and Capacitors

3.1 Ballast Construction

3.1.1 Fluorescent Lamp Ballasts

The housing of a typical ballast for two, 40-watt lamps is heavy-gauge steel measuring 5.8 x 2.16 cm (not including the mounting brackets). Typical ballasts contain a reactor (a core and coil assembly), a capacitor, and a thermal protector (Photo 2). The reactor measures approximately $10.2 \times 5.5 \times 3.8$ cm deep. It is the capacitor that could contain PCBs.

When the ballast is manufactured, the core and coil assembly are mounted inside the ballast housing and are connected to the capacitor. The colour-coded, interconnecting wires are designed primarily for ease of installation. Fluorescent ballasts are filled with an asphalt/silica compound which is mixed with very fine silica powder. This compound serves to dissipate heat, protect from moisture, and reduce sound produced by the core and coil assembly.

Fixture safety specifications from the Canadian Standards Association (CSA) require that the ballast case temperatures not exceed 90° C under normal operation. Furthermore, the thermal protector within the ballast (Photo 2) de-energizes the circuit when the internal temperature exceeds 105° C. The thermal protector may be either an automatic resettable type or a non-resettable type. Once the non-resettable protector is deactivated by high temperature, the ballast must be replaced. Some ballasts are designed to de-energize at 120° C, at which temperature a small amount of asphalt compound may soften and leak out.

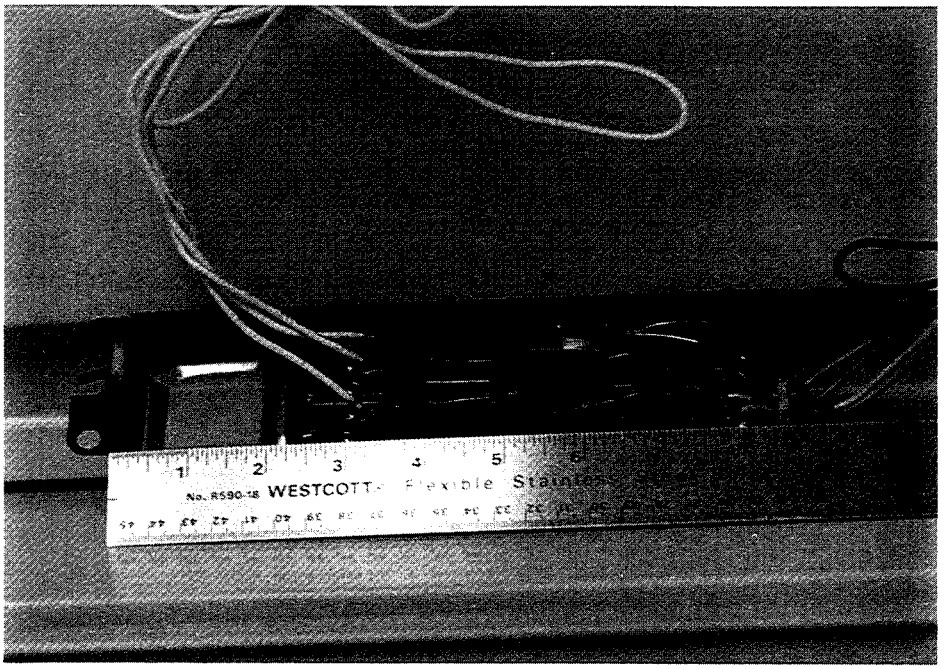
3.1.2 High Intensity Discharge (HID) Ballasts

Because most HID lamps operate at much higher wattage than fluorescent lamps, the average HID ballast requires much higher reactance and capacitance than the typical fluorescent ballast. Some HID ballasts do not have an asphalt seal and some have more than one capacitor. The PCB content of the capacitor depends on its voltage and capacitance ratings. These ratings depend on the size and type of lamp and the performance specifications of the ballast. Generally, metal halide lamps require higher voltage than mercury lamps. Most HID ballasts contain between 0.091 kg and 0.386 kg of PCBs.

3.1.3 Potential for PCB Release from Ballasts

Because of the elaborate physical containment of the components in fluorescent lamp ballasts and their low normal operating temperatures, it is unlikely that PCBs will escape into the environment. It is possible, however, for a ballast to overheat and some of the asphalt compound to leak out. It is this small amount of asphalt compound that is generally mistaken for a PCB leakage. When cooled to room temperature, the asphalt will re-harden; however, the PCB dielectric from a capacitor, if present, will remain as a heavy oil.

High Intensity Discharge ballasts without asphalt sealant have a greater potential for leakage due to puncture or perforation of the capacitor. These ballasts are sometimes located where they are exposed to moisture



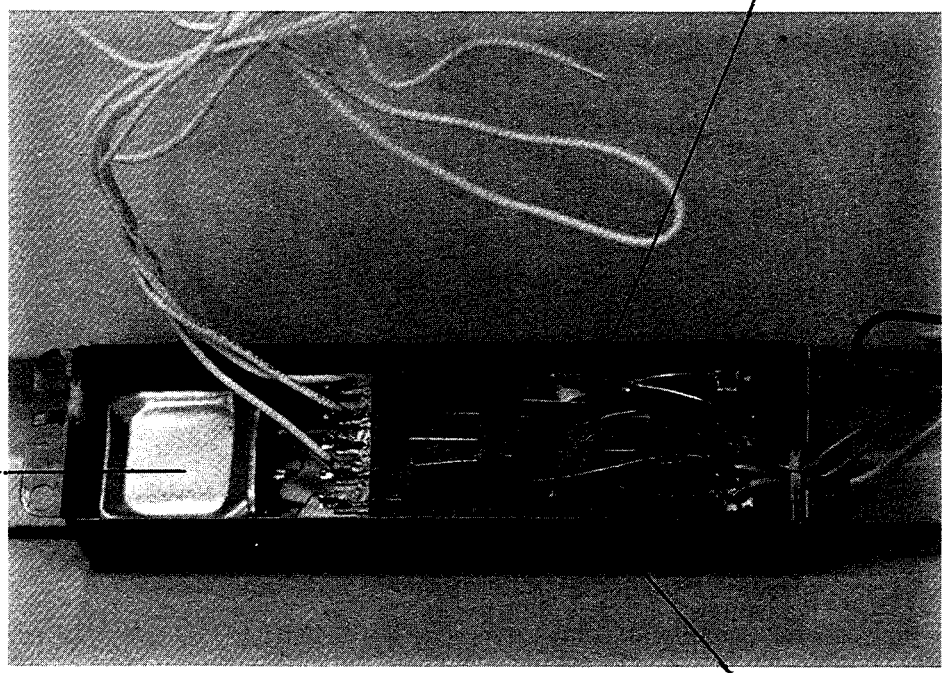


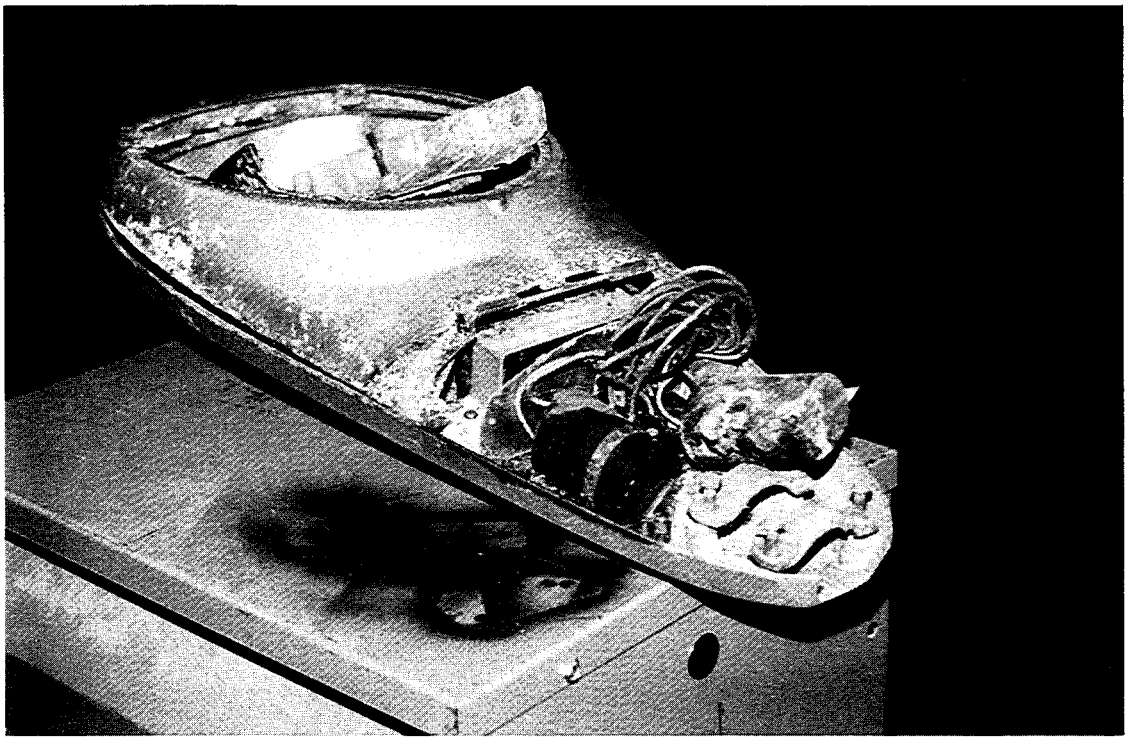
Photo 2 Components of a Fluorescent Lamp Ballast

and road salt. Photo 3 shows a used street lamp with rusted internal components.

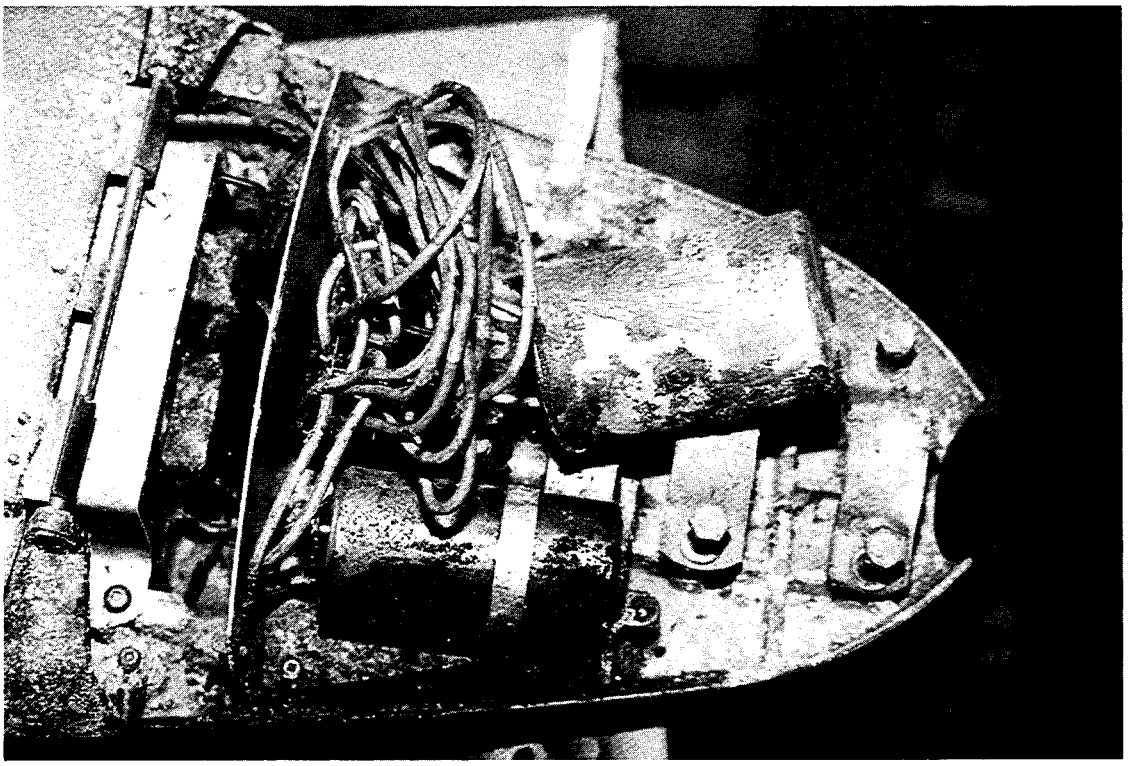
3.2 Ballast Capacitors

There are many types of capacitors and they differ primarily in the type of material used as a dielectric. Typical dielectrics are plastic-film, mica, ceramic, and oil-impregnated paper. In ballast capacitors manufactured with oil-impregnated paper, one of the oils used was PCBs.

A typical capacitor can for a fluorescent ballast is $5.1 \times 5.1 \times 1.9$ cm and is made of tinned steel. A capacitor used for two, four-foot fluorescent lamps contains 23.6 g (17.2 mL) of PCBs. The largest amount of PCBs found in a ballast is in fixtures for 1500 Metal Halide lamps, which have three capacitors and are used only outdoors. Each of the capacitors in these lamps could contain about 185 mL of PCBs. Some of the PCBs are absorbed in the paper layers of the capacitor.



3a. HID Street Lamp



3b. Close-up of HID Street Lamp

Photo 3 High Intensity Discharge (HID) Street Lamp

Section 4

Identification of Capacitors and Ballasts Containing PCBs

Manufacturers of ballasts and capacitors use distinct catalogue and date codes to identify their product, its date of manufacture, and, for some capacitors, its dielectric fluid. In a ballast filled with asphalt, the capacitor is not very accessible. Therefore, correctly interpreting the manufacturer's codes on the ballast is very important in determining whether a ballast could contain a PCB capacitor. The following section contains information to assist in interpreting these codes.

A NOTE OF PRECAUTION:

DO NOT ATTEMPT TO REMOVE AN ENERGIZED BALLAST FROM ITS MOUNT IN THE LAMP FIXTURE. Under no circumstances should an inexperienced or untrained person attempt to remove a ballast unless the electrical current is SWITCHED OFF and locked or otherwise protected to ensure that the current cannot be reactivated while the ballast is being removed.

4.1 Capacitor Manufacturers

4.1.1 Aerovox Canada Limited

Aerovox manufactures capacitors for use in a variety of electrical equipment, including lighting systems assembled and sold by other manufacturers in Canada and the USA. Aerovox switched to non-PCB capacitors in 1979 and capacitors manufactured before 1979 could contain PCBs.

Capacitors manufactured by Aerovox have date codes and catalogue codes stamped on the capacitor can. Therefore, if a fluorescent or HID lamp ballast has been disassembled, information on the ballast capacitor can be checked to determine if the capacitor contains PCBs. The date code consists of four digits, identifying the year and week of manufacture. For example, the code **8252** indicates that the capacitor was manufactured in the 52nd week of 1982. The date code could be preceded by two letters that indicate which country the capacitor was manufactured in. The letters **AE** indicate that the capacitor was manufactured in Canada; the letters **AH** indicate that the capacitor was manufactured in the United States.

The catalogue code could also be used to determine whether the capacitor contains PCBs. Before 1979, the code had the following form: **P 193 FC**. The first unit, which identifies the material of the capacitor plate, is either **P**, **Z**, **H**, or **N**. The second, third and fourth units (numbers) identify the capacitor's size. The fifth and most important unit is either **G**, **R**, or **F**. An **F** identifies that the ballast capacitor contains PCBs. A **G** or an **R** indicates a non-PCB capacitor. The sixth and final unit is a letter from A to R which identifies the particular brand of dielectric liquid.

After 1979, the catalogue code had the following form: **Z 93 P 3417 E**. As Aerovox capacitors made after 1979 do not have PCBs, a capacitor with such a catalogue code does not contain PCBs. Capacitors with the old style of catalogue code or a date code indicating that the capacitor was manufactured before 1979 could contain PCBs.

Aerovox, like other capacitor manufacturers, voluntarily included the words **NO PCB** on capacitors manufactured after 1979 (Photo 4).

Photo 4 **Ballast Capacitor.** An Aerovox capacitor with **NO PCB** stamped on the can. The label markings indicate that this capacitor was made in the 19th week of 1987.

4.2 Ballast Manufacturers and Suppliers

4.2.1 Advance Ballasts

In Canada, Advance fluorescent ballasts are supplied by Philips Lighting but Advance has its own date code system which is different from that used by Philips.

The date code is stamped on the ballast cover. An example code would be **1-90**. The first digit represents the month of manufacture and the second and third digits represent the year of manufacture. The code **1-90** therefore indicates that the ballast was manufactured in January 1990.

Advance ballasts manufactured before 1978 could contain PCB capacitors. Those manufactured during 1978 could also contain PCB capacitors because 1978 was a transition year during which the use of PCB capacitors was phased out. Ballasts manufactured from 1979 onwards do not contain PCB capacitors.

4.2.2 Allanson Division of Jannock Limited

Allanson switched from PCB to non-PCB capacitors in 1980. The catalogue identification code stamped on the ballast nameplate identifies whether an Allanson ballast contains a PCB capacitor.

The code consists of two letters representing the year and month of manufacture. An example code would be **DM**. The first letter, **D**, represents the month of manufacture, i.e., April. The second letter, **M**, represents the year of manufacture, with the letter **A** representing the year 1969 and the letter **Q** being omitted in the series. In this example, **M** represents 1981. Ballasts with the code **AM** and higher do not contain PCB capacitors.

In May 1987, Allanson switched from alpha to numeric coding (i.e., May 1987 = **0587**). Ballasts produced after this date have **NO PCB** on the product label.

Allanson uses the same catalogue identification code for their HID ballasts as for their fluorescent lamp ballasts. A more specific method to determine whether an

Allanson HID ballast contains a PCB capacitor, however, is to check the type number located on the ballast nameplate. If the number has the prefix **N**, the ballast does not contain PCB capacitors. If the **N** does not appear, the ballast contains PCB capacitors (Photo 5).

4.2.3 Canadian General Electric

Canadian General Electric (CGE) switched to non-PCB capacitors in March 1978. The label on a typical CGE ballast has the following type of manufacturer's code: **17 A 28 7 E.**

The final letter of this code indicates whether the ballast capacitor contains PCBs (Photo 6a). If the final letter is **N** or **A**, then the ballast capacitor probably contains PCBs. If the final letter is **E**, or any combination with **E**, such as **E1**, **ER**, or **EW**, the ballast capacitor does not contain PCBs (**E** stands for environmental). If the final letter is **T**, the ballast capacitor may contain PCBs (Photo 6b). It is unfortunate that the identification cannot be more positive but the problem arose from the fact that Canadian General Electric used a **T** to identify ballasts manufactured up until shortly after they switched to using a non-PCB dielectric fluid in March 1978. Since the switch to **E** did not occur at the same time as the changeover to non-PCB capacitors, the **T** does not confirm that the ballast has a non-PCB capacitor.

In Canada, some codes on CGE ballasts included the letter **W** after the **E** or **T** code to indicate an extended warranty period.

Canadian General Electric also stamped a date code on the back of the ballast housing or on the nameplate. If the manufacturer's code ends with **T**, the date code can be used to more accurately determine whether the ballast contains a PCB capacitor. If a person has access to a de-energized, unmounted ballast, the date code can easily be read on the ballast housing (Photo 6c).

Ballasts manufactured before March 1978 could contain PCB capacitors. The code shown in Photo 7, **2811**, is interpreted by

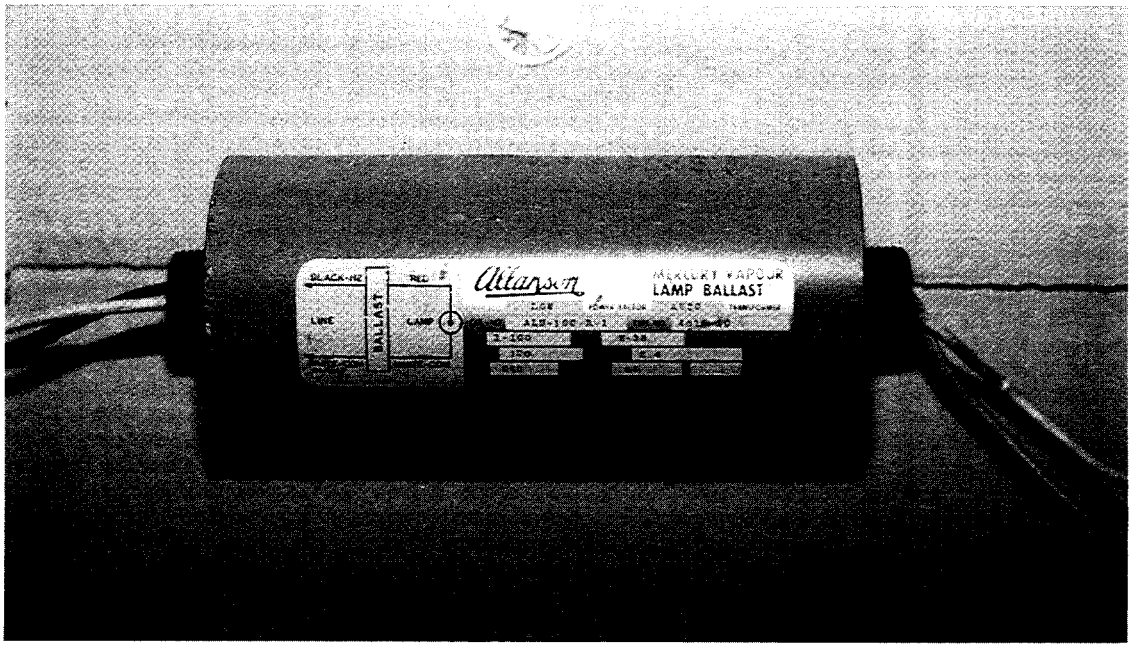
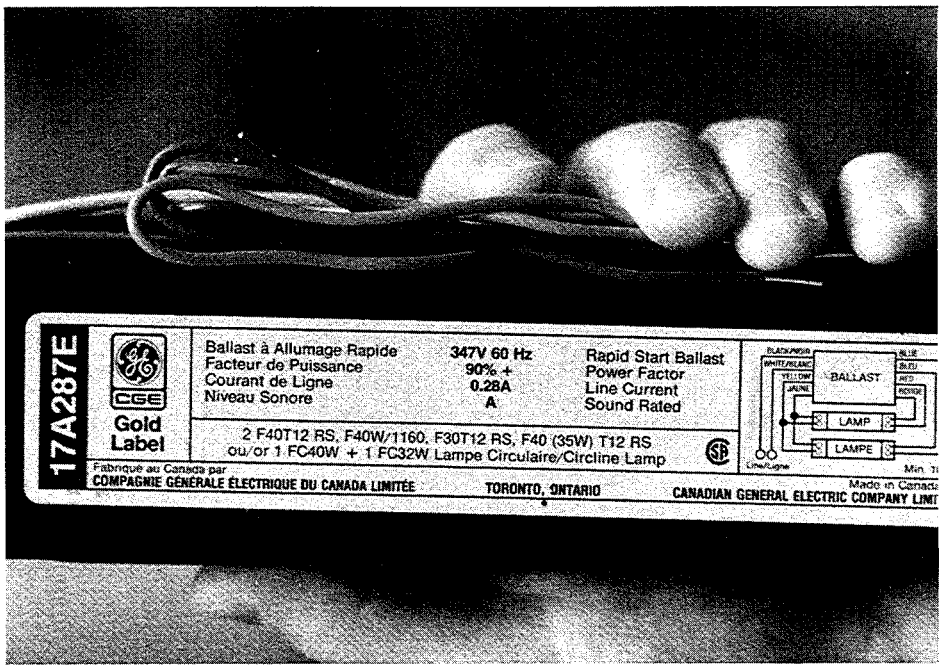
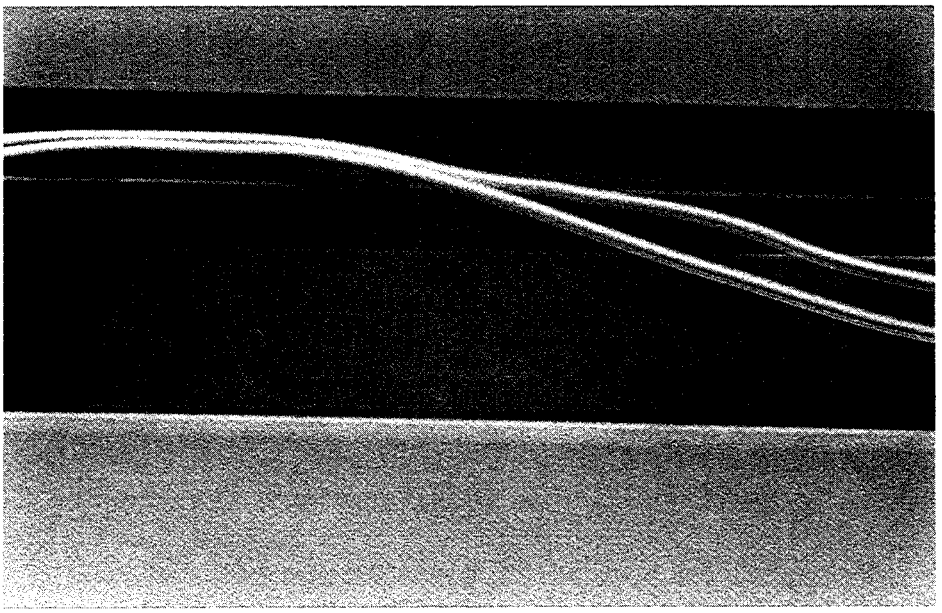


Photo 5 **Allanson High Intensity Discharge (HID) Lamp Ballast.** The **AL** at the beginning of the catalogue number indicates that this ballast was made in January (A), 1980 (L). This ballast contains PCBs.



6a. The **E** at the end of the manufacturer's code, **17A287E**, clearly identifies this CGE ballast as a non-PCB unit.



6b. The **T** at the end of the manufacturer's code, **17A187T**, identifies this ballast as possibly containing PCBs. The date code must be checked to determine PCB or non-PCB status.

Photo 6 Canadian General Electric Lamp Ballasts

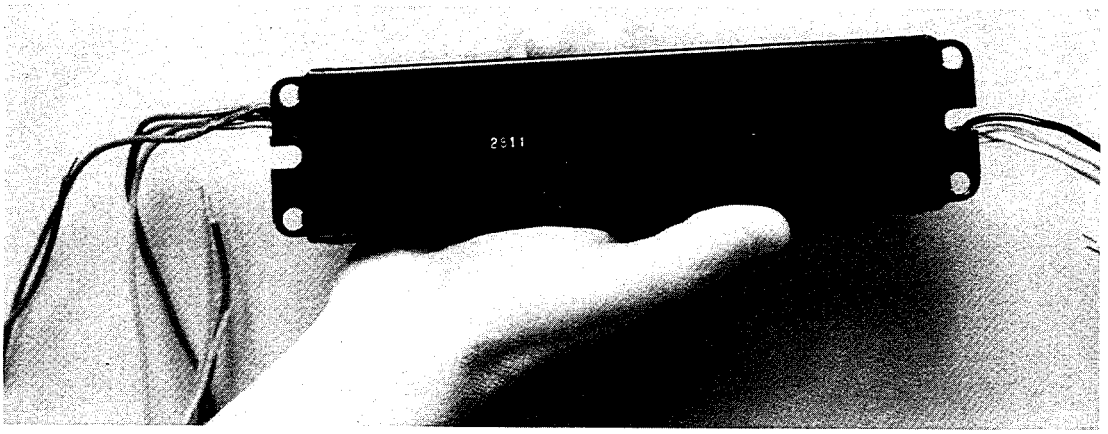


Photo 6c. Example of a Manufacturer's Date Code. The first two digits on this date code must be reversed to determine the year of manufacture. This CGE ballast was made in November (11), 1982 (28).

Photo 6 Canadian General Electric Lamp Ballasts (cont.)

reversing the first two numbers to determine the year of manufacture. The last two numbers represent the month of manufacture. The ballast shown was manufactured in November (11), 1982 (28).

Date codes from **8703** onwards designate non-PCB ballasts, regardless of the manufacturer's code on the label.

Finally, the CGE coding method applies to both HID and fluorescent lamp ballasts.

4.2.4 Holophane Canada Inc.

Holophane manufactures only HID lamp ballasts. Any ballasts manufactured before 1978 contain PCB capacitors while those manufactured after 1980 do not contain PCB capacitors. If a ballast was manufactured between 1978 and 1980, it may contain a PCB capacitor.

If the capacitor is accessible, the Holophane alphanumeric system can be used to assist in determining whether the capacitor contains PCBs. Capacitors marked **BAA nnn** contain PCBs; capacitors marked **BAB nnn** do not contain PCBs (where **nnn** is a numeric sequence).

4.2.5 Magnatek Polygon

Magnatek Polygon does not manufacture ballasts in Canada. It imports them from Magnatek Universal Manufacturing in the United States for use in Canada. The date code on the ballast will be one of three types:

218 XX XX	if made before 1968
J XX XX	if made after late 1967
W XX XX	if made after 1977

In all three cases, the four Xs are numbers which represent the year and month of manufacture. For example, the code **J 67 12** identifies a ballast made in December 1967. If **High Power Factor** appears on the label and the ballast was manufactured before 1978, it contains at least one PCB capacitor. Any ballasts manufactured after January 1978 contain PCB capacitors unless there is either a green sticker or **NO PCB** appears on the ballast label. Ballasts manufactured after July 1980, do not contain PCB capacitors.

This coding scheme applies to both fluorescent and HID lamp ballasts.

4.2.6 Magnatek Universal Manufacturing (USA)

High power factor ballasts manufactured by Magnatek Universal Manufacturing are clearly identified with a date code located on the side of the ballast cover opposite the company label. The date code consists of a letter prefix representing the month and a two-digit number representing the year. For example, the code **C79** identifies a ballast manufactured in March 1979.

Magnatek Universal Manufacturing switched to using non-PCB capacitors in 1978 and since then all ballasts containing non-PCB capacitors have been marked **NO PCB**. Also, for approximately two years after the switch to non-PCB capacitors, all catalogue numbers for equipment containing a non-PCB capacitor included an **N** suffix.

High Intensity Discharge lighting manufactured by Magnatek Universal Manufacturing containing non-PCB capacitors is marked **NO PCB** on either the outside of the unit or directly on the capacitor can inside the unit.

4.2.7 Philips Lighting

Fluorescent ballasts manufactured by Philips Lighting are identified with a three- or four-digit manufacturing date code stamped onto the ballast housing, on a tab on the side, or on the side facing the ceiling.

Before 1980, these codes represented only the month and year of manufacture. For example, a three-digit code, such as **575**, represents May (5), 1975 (75). A four-digit code, such as **1175**, represents November (11), 1975 (75). If the ballast was manufactured after 1980, this particular code could also be interpreted as indicating the year of manufacture as 1981 from the first digit (1); the week of manufacture as the seventeenth week, from the next two digits (17); and the day of manufacture as the fifth day, from the last digit (5).

Philips stopped using PCB capacitors in late 1978. All ballasts manufactured *after* early 1979 were non-PCB units, and marked as such on the label. In other words, if a ballast manufactured by Philips was stamped with the code **1175** and was *not* marked on the label as a non-PCB unit, it was manufactured in 1975 and would contain PCBs. The markings on the label should be checked on ballasts which have an older appearance and are stamped with four-digit codes.

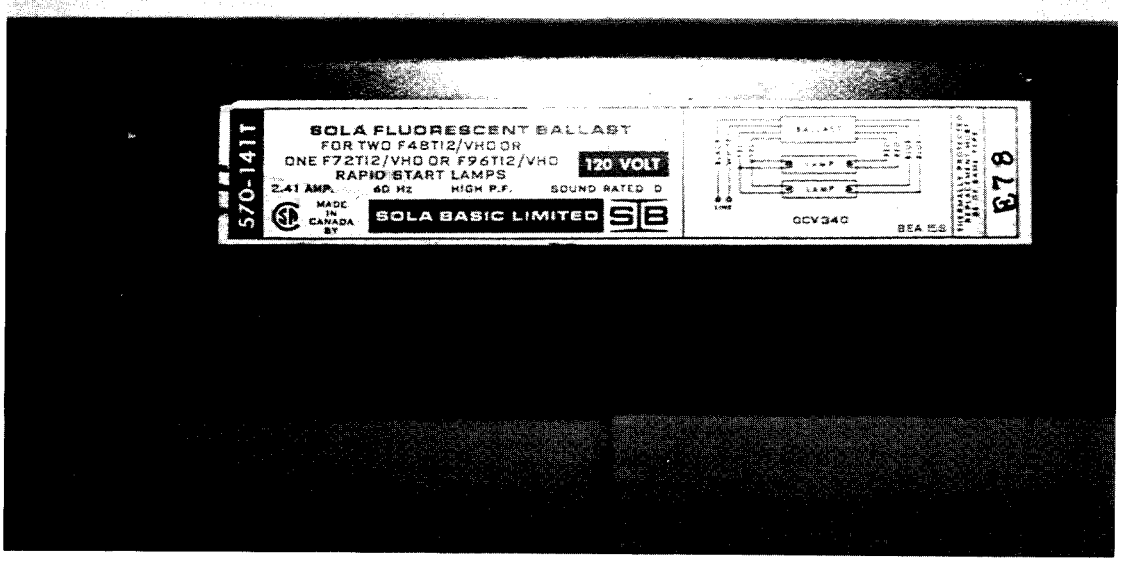
All HID ballasts manufactured by Philips are clearly marked on the capacitor as either **PCB** or **non-PCB**.

4.2.8 Sola Canada

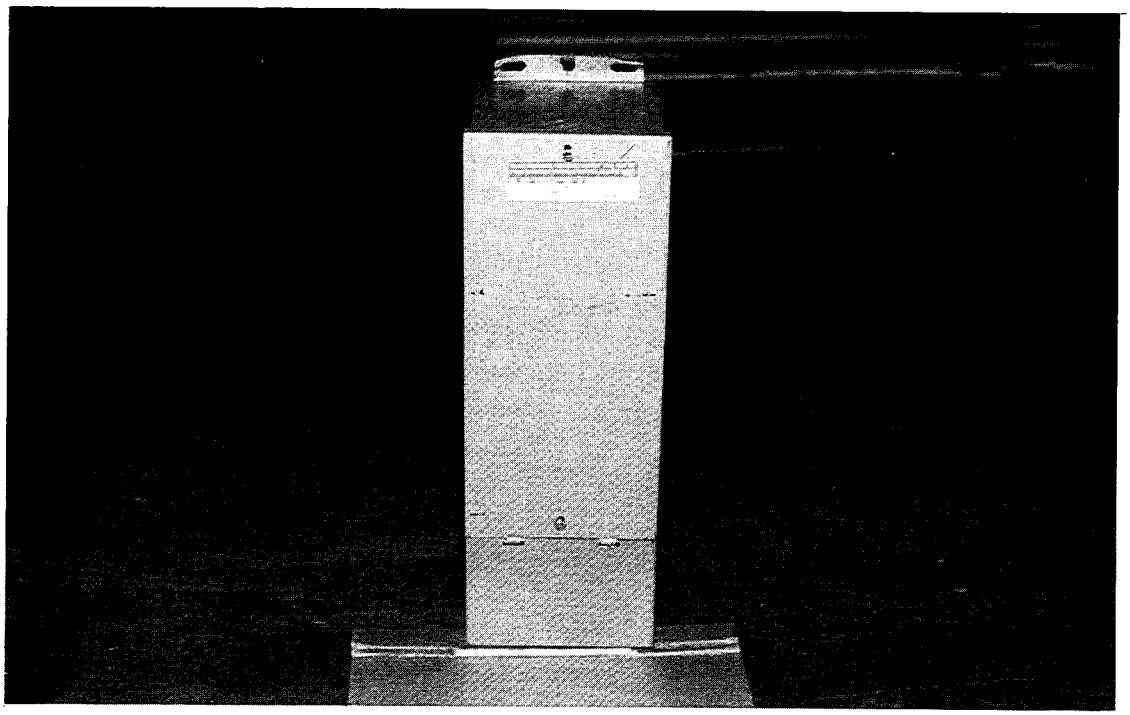
The date of manufacture of Sola ballasts can be determined from the date code on the ballast label (Photo 7). An example code would be **A68**.

The letter indicates the month of manufacture (A = January, B = February, etc.) and the numbers represent the year of manufacture (e.g., 68 = 1968). Any ballast manufactured by Sola in 1980 or later, i.e., with date code **A80** or later, does not contain PCBs. It should be assumed that all ballasts manufactured by Sola Canada before January 1980 contain PCB capacitors unless otherwise indicated on the ballast.

This also applies to HID ballasts, but if the capacitor is accessible, the PCB content of the capacitor can be determined using the Sola part number stamped on the capacitor. An example code would be **ACA 109**. If the first three letters are ACB, then the capacitor is non-PCB. If the first three letters are **ACA**, then the capacitor contains PCBs.

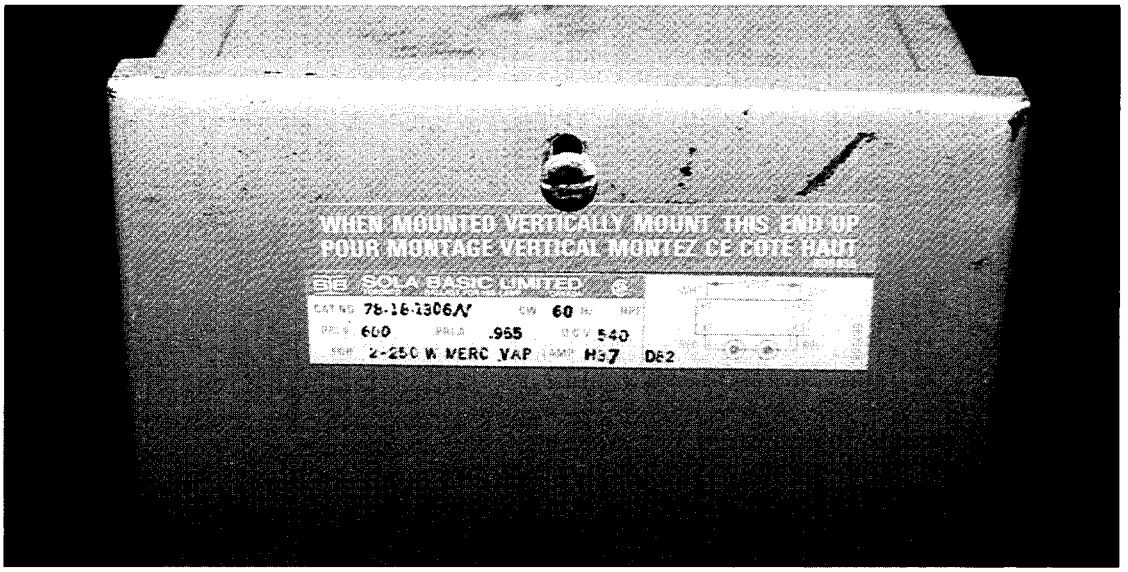


7a. A Sola Canada fluorescent lamp ballast. The **E78** at the far right of the label indicates that this ballast was made in May 1978 and, therefore, contains a PCB-filled capacitor.



7b. A Sola Canada HID lamp ballast.

Photo 7 Sola Canada Lamp Ballasts



7c. Close-up of the ballast label showing the date code stamped near the circuit diagram. **D82** indicates that the ballast was made in April 1982, and is a non-PCB unit.

Photo 7 Sola Canada Lamp Ballasts (cont.)

4.2.9 Sola Electric (USA)

Fluorescent lamp ballasts manufactured by Sola USA are marked with the company name, address, and ratings on a nameplate affixed to the metal housing. These ballasts are also marked with a code showing manufacturing date and location. An example of a code is: **61 F 311 EG**.

The first two numbers, **61**, indicate the year of manufacture (1961). The letter **F** indicates the month of manufacture (F = sixth month, June). The **311** is the serial number of a particular manufacturing lot. This number can be 1 to 4 digits and may not be used for all lots. **EG** indicates that the ballast was manufactured in the Sola plant in Elk Grove Village, Illinois. **FP** indicates manufacture in the Sola plant in Fort Payne, Alabama.

Sola USA stopped producing their standard line of fluorescent ballasts in 1975. All types of ballasts manufactured by Sola USA in 1979 or before could contain PCB capacitors.

4.2.10 Westinghouse Canada

Westinghouse Canada manufactured both fluorescent and HID lamp ballasts until the early 1970s. After that, their fluorescent lamp ballasts were manufactured by Canadian General Electric with Westinghouse labels. Westinghouse continued manufacturing HID lamp ballasts until 1982.

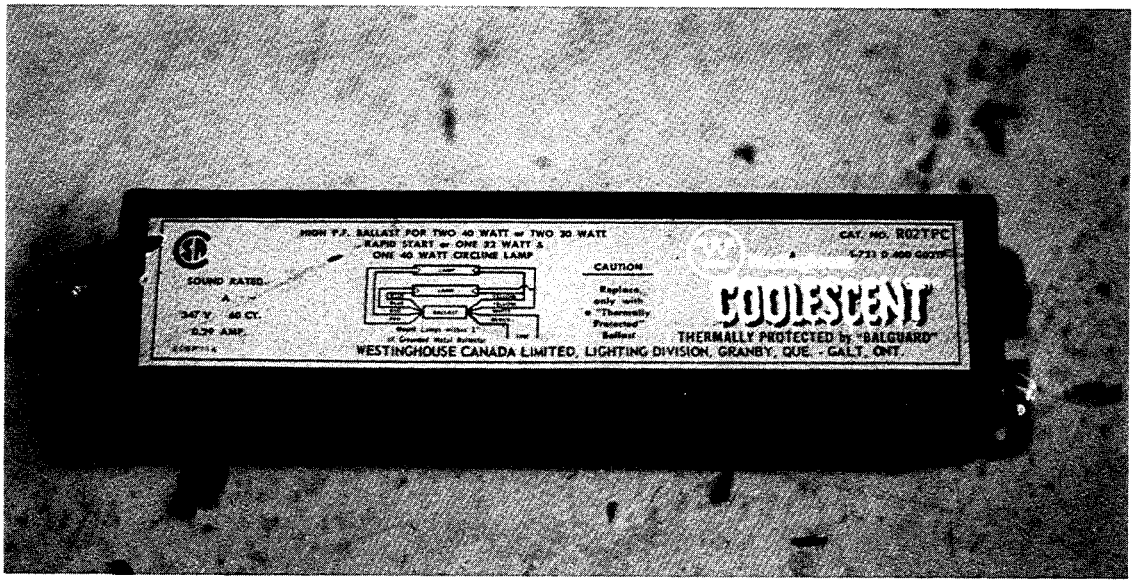
Westinghouse stamped date codes on each fluorescent ballast enclosure and on each HID product label and HID core/coil ballast label (Photo 8b and 8d). At first, Westinghouse used an alphanumeric date code on their fluorescent ballasts; then they switched to a strictly numeric date code.

An example of an alphanumeric code would be **A-78** with the letter representing the month of manufacture (A=January, B=February, etc.) and the numbers representing the year of manufacture (e.g., 78=1978). The numeric code was in the form **01-99** with the first two numbers

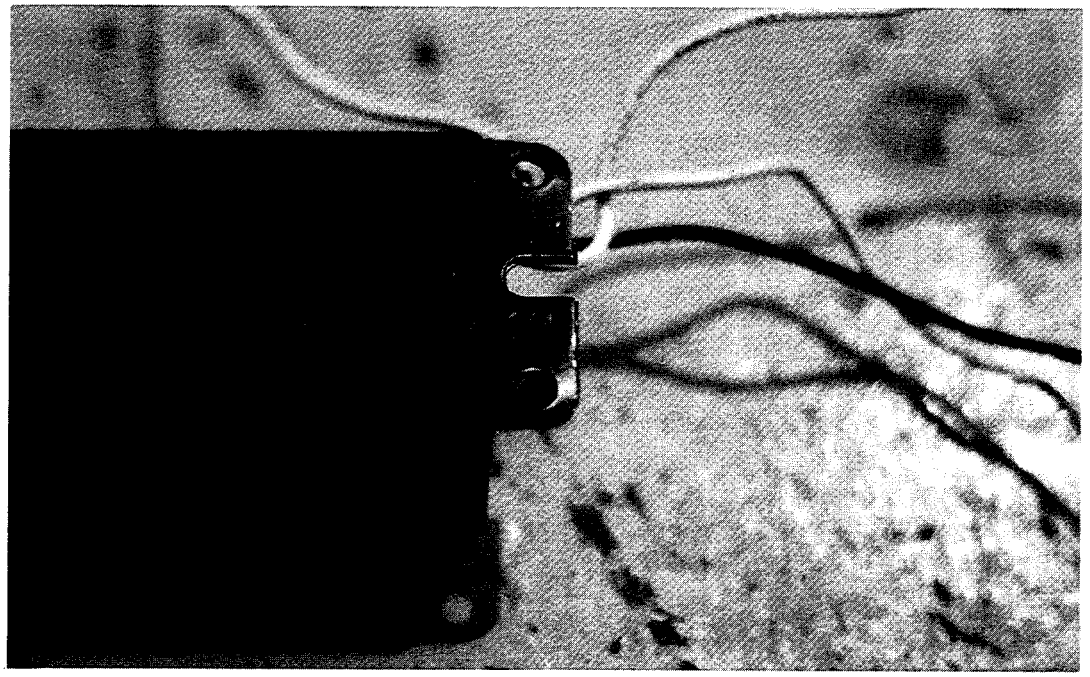
representing the month of manufacture (e.g., 12 = December).

When CGE began manufacturing fluorescent ballasts for Westinghouse, the CGE date code system was used (see section 4.2.3).

Westinghouse continued to use the alphanumeric date code system on their HID ballasts. Fluorescent ballasts made from 1978 onwards have **NO PCB** marked on the label.

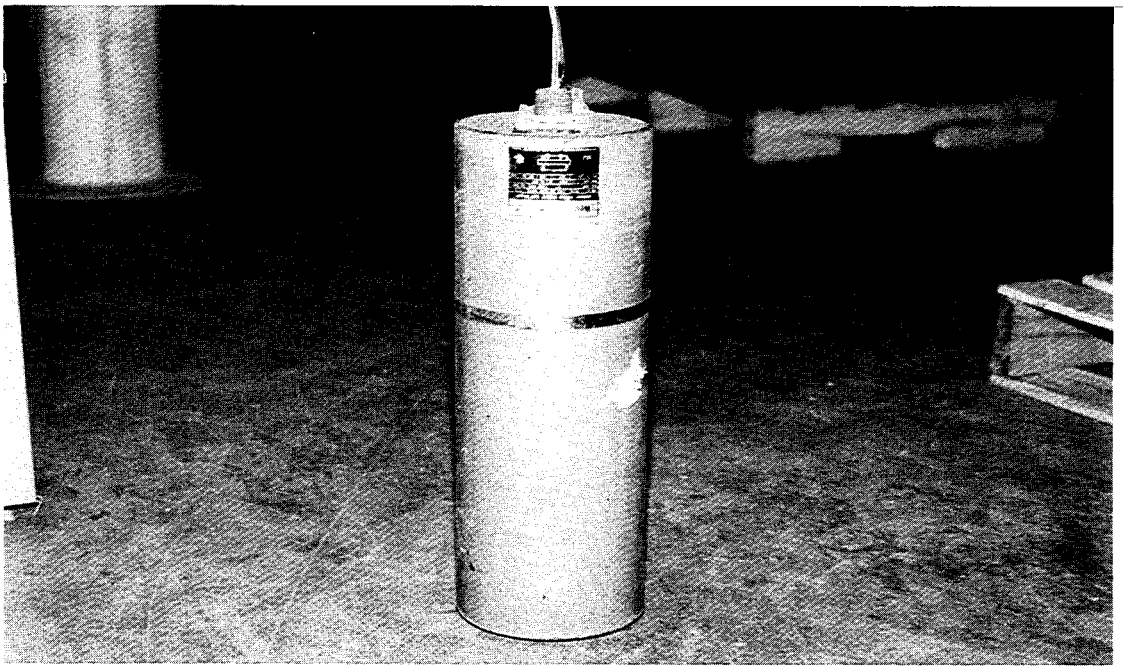


8a. A Westinghouse fluorescent ballast. The date code is on the bottom of the ballast.

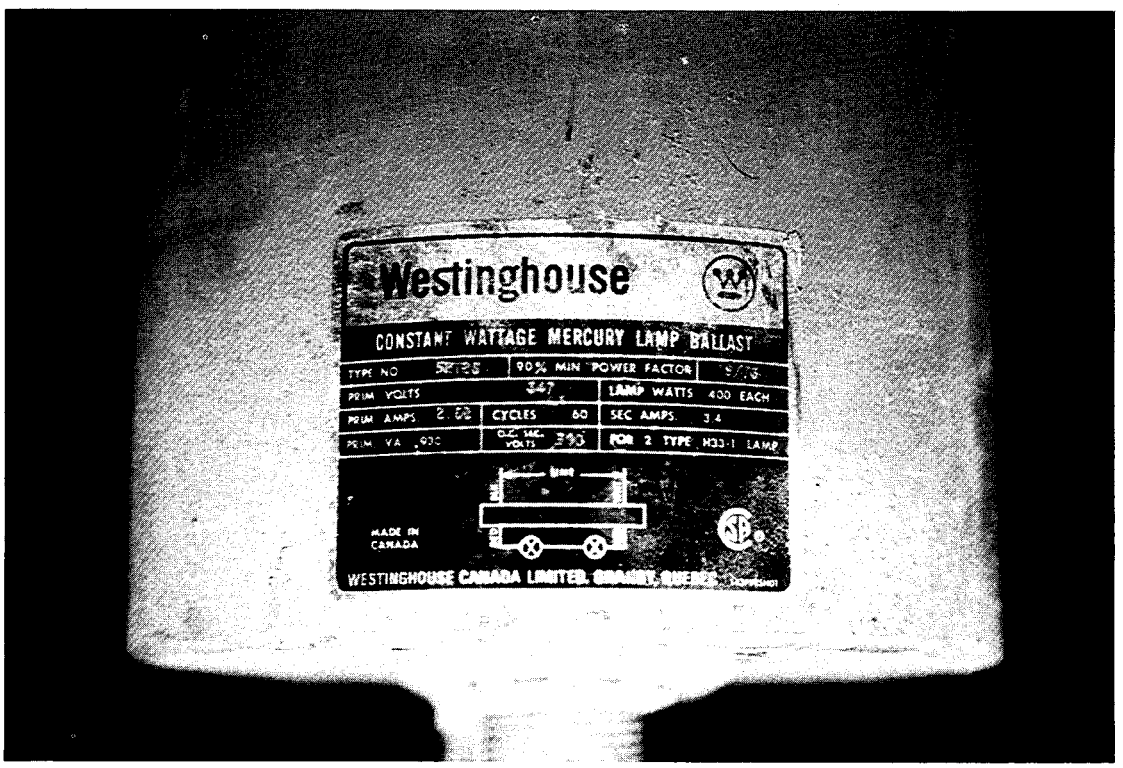


8b. Here the date code, **1271**, is visible. The code indicates that the ballast was made in December, 1971.

Photo 8 Westinghouse Canada Lamp Ballasts

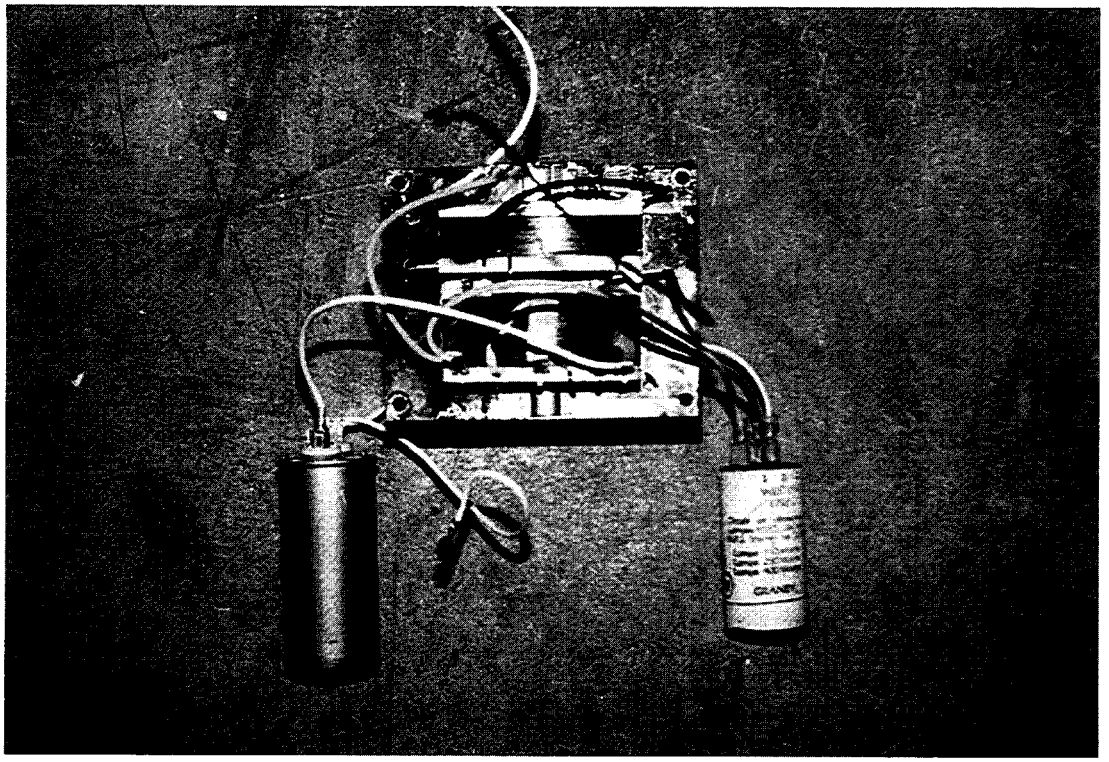


8c. A Westinghouse HID lamp ballast.



8d. Close-up of Photo 8c. The date code, G/73 (located below the word "BALLAST"), indicates that the ballast was made in July 1973, and contains PCB-filled capacitors.

Photo 8 Westinghouse Canada Lamp Ballasts (cont.)



8e. Westinghouse HID ballast showing components.

Photo 8 Westinghouse Canada Lamp Ballasts (cont.)

Section 5

Storage and Disposal

The federal government has published an Interim Order on the Storage of PCB Wastes. This Order specifies requirements for storage of PCB waste, including site location and access, fire protection and emergency procedures, maintenance and inspection, labelling, maintenance of books and records, and reporting requirements.

According to the Interim Order, PCB wastes include PCB liquids, PCB solids, and PCB equipment taken out of service for the purpose of disposal. PCB equipment includes PCB capacitors. Lamp ballasts containing PCB capacitors automatically qualify as PCB waste and must be stored according to the requirements of the Interim Order.

The Interim Order applies to all federal and provincial storage sites, except those in provinces where legally enforceable requirements have been put in place that are comparable in effect to the Order.

With the exception of federal PCB wastes, the provinces are responsible for disposing of PCB wastes in Canada. Consequently, for non-federal wastes, the appropriate provincial environment agency should be consulted for specific provincial requirements for PCB waste disposal. These offices are listed in Appendix B.

The federal government is currently planning to turn the Interim Order into a regulation. Anyone involved in storing or disposing of lamp ballasts should confirm the current regulatory requirements with Environment Canada. Environment Canada's regional offices are listed in Appendix A.

Appendix A

Environment Canada Regional Offices

Atlantic
Contaminants and Assessments Branch (902) 426-6142
Toxics, Contaminants and Hazardous Waste Division
Environment Canada
15th floor, Queen Square
45 Alderney Drive
Dartmouth, Nova Scotia
B2Y 2N6

Quebec
Environmental Contaminants (514) 283-2349
Environment Canada
1179 de Bleury St., 2nd floor
Montreal, Quebec
H3B 3H9

Ontario
Contaminants and Nuclear Programs Division (416) 973-1075
Environment Canada
25 St. Clair Ave. East,
7th floor
Toronto, Ontario
M4T 1M2

Western and Northern
Industrial Contaminants (403) 468-8034
Environment Canada
Twin Atria No. 2, 2nd floor
Room 210, 4999 - 98 Avenue
Edmonton, Alberta
T6B 2X3

Pacific and Yukon
Dumping and Contaminants Control (604) 666-2588
Environment Canada
224 West Esplanade
North Vancouver,
British Columbia
V7M 3H7

Appendix B

Provincial Environment Ministry Offices

Alberta
Alberta Environment 1-800-222-6514
Waste Management Division 24-hour line
9820 106 St., 4th floor (in Alberta)
Edmonton, Alberta
T5K 2J6

British Columbia
Ministry of the Environment (604) 387-9955
Environmental Protection
Division
810 Blanshard St.
Victoria, British Columbia
V8V 1X5

Manitoba
Department of the (204) 945-7083
Environment
Waste Management Division
Room 960
330 St. Mary Ave.
Winnipeg, Manitoba
R3C 3Z5

New Brunswick
Department of the (506) 453-2861
Environment
Operations Branch
P.O. Box 6000
364 Argyle Street
Fredericton,New Brunswick
E3B 5H1

Newfoundland
Department of Environment (709) 576-5783
and Lands
P.O. Box 8700
St. John's, Newfoundland
A1B 4J6

Northwest Territories
Department of Renewable (403) 873-7654
Resources
Pollution Control Division
Scotia Centre
4th floor
Box 1320
Yellowknife, Northwest Territories
X1A 2L9

Nova Scotia
Nova Scotia Department (902) 424-5300
of the Environment
Resource Management
and Pollution Control
Assessment Division
5151 Terminal Road
P.O. Box 2107
Halifax, Nova Scotia
B3J 3B7

Ontario
Ministry of the Environment (416) 424-3000
Central Regional Office
7 Overlea Blvd.,
4th floor
Toronto, Ontario
M4H 1A8

Northeastern Regional Office (705) 675-4501
199 Larch St., 11th floor
Sudbury, Ontario
P3E 5P9

Northwestern Regional Office (807) 475-1205
435 James St. South, 3rd floor
P.O. Box 5000
Thunder Bay, Ontario
P7C 5G6

Southeastern Regional Office (613) 549-4000
133 Dalton Avenue
P.O. Box 820
Kingston, Ontario
K7L 4X6

Southwestern Regional Office (519) 661-2200
985 Adelaide Street
London, Ontario
N6E 1V3

West Central Regional Office (416) 521-7640
119 King St. West
12th floor
P.O. Box 2112
Hamilton, Ontario
L8N 3Z9

Prince Edward Island

Department of the Environment (902) 368-5024
Environmental Protection Branch
P.O. Box 2000
11 Kent Street
Charlottetown,
Prince Edward Island
C1A 7N8

Quebec

Environment Quebec (418) 644-3420
Dangerous Substances Directorate
3900 Marly Street
P.O. Box 34
Ste. Foy, Quebec
G1X 4E4

Saskatchewan

Saskatchewan Environment and Public Safety (306) 787-6191
Waste Management Section
3085 Albert Street
Regina, Saskatchewan
S4S 0B1

Yukon

Department of Community and Transportation Services (403) 667-3032
Dangerous Goods
P.O. Box 2703
Whitehorse, Yukon
Y1A 2C6

Appendix C

Capacitor and Ballast Manufacturers

(i) Capacitor Manufacturers

Aerovox Canada Limited (902) 667-3886
P.O. Box 250
Amherst, Nova Scotia
B4H 3Z2

(ii) Ballast Manufacturers and Suppliers

Most fluorescent and HID lamp ballasts used in Canada come from the following domestic and foreign manufacturers and suppliers.

Allanson Division of Jannock Limited (416) 755-1191
33 Cranfield Rd.
Toronto, Ontario
M4B 3H2

Canadian General Electric 1-800-668-4640
2300 Meadowvale Blvd. (in Ontario)
Mississauga, Ontario
L5N 5P9

Holophane Canada Inc. (416) 793-3111
1620 Steeles Ave. East
Brampton, Ontario
L6T 1A5

Magnatek Polygon (416) 755-3301
50 Northline Road
Toronto, Ontario
M4B 3E2

Magnatek Universal Manufacturing (USA) (201) 684-1400
29 East Sixth Street
Paterson, New Jersey 07509

Philips Lighting (416) 292-5161
601 Milner Avenue
Scarborough, Ontario
M1B 1M8

Sola Canada (416) 252-6465
377 Evans Avenue
Toronto, Ontario
M8Z 1K8

Sola (USA) (312) 439-2800
1717 Busse Road
Elk Grove Village,
Illinois 60007

Westinghouse Canada (416) 528-8811
P.O. Box 2510
Hamilton, Ontario
L8N 3K2

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