TO:

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BALLAST CAPACITORS

CHILE AND ARGENTINA

In Chile, General Electric's low-cost Aroclor 1242 ballast capacitors are replaced with still lower-cost Japanese capacitors that do not use Aroclor.

(We never seem to learn anything at home - have to run down to Chile - where they don't make capacitors - and on to Argentina - to guess what gives with SHIZUKI in Japan - then home for writings - hopefully without too many confusions!)

The SHIZUKI development appears a possible threat against Aroclor for low-voltage ballast capacitors, especially in international markets. Until we learn the intrinsic economics and quality of the SHIZUKI metallized film capacitor, we cannot fully judge its potential significance.

Since SHIZUKI is an affiliate of Mitsubishi, we should be able to learn more about their development of low sale price, metallized-paper capacitors.

We merely seek better understanding. This is not intended to unduly concern our people regards the proposed Aroclor plant.

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Because CHILE does not have the paper and aluminum foil which are the expensive items in making Aroclor type capacitors, they have always imported their capacitor requirements.

BONET-PARRAGUE, primarily transformer makers, merely assemble fluorescent lighting ballast and had imported the capacitors from General Electric, Hudson Falls, New York, the world's lowest cost producer of Aroclor-fixed paper ballast type capacitors. Only G.E. has a fully automated process, using a very minimum of labor. Additionally, their designs reflect maximum miniaturization for the lowest material costs.

But B-P discontinued purchase from G.E. because they now buy ballast capacitors at lower cost from SHIZUKI, Japan. The B-P man knew nothing about the design of these capacitors, and could only say that the JAPANESE capacitors are impregnated with mineral oil and not Aroclor.

Based on well known characteristics of capacitance, it seems beyond reason that the Japanese could impregnate paper with mineral oil to compete against G.E.'s small paper-Aroclor impregnated units. Something has to make more sense than this. The following information gathered later in ARGENTINA sounds plausible:

PADOANI, who make AROCLOR 1254 ballast capacitors in BUENOS AIRES, are studying the SHIZUKI units. There is plenty of incentive to do this because the Japanese units are reported to sell as low as forty cents. Probably this is near G.E.'s lowest price, and far below PADOANI'S price--around eighty cents. The Japanese units are very small, seem to have good quality and life, said Mr. Padoani.

It was interesting to hear MR. PADOANI say that the Japanese units ARE NOT impregnated with mineral oil. But he did not know exactly what is used.

He had a sample of MIXOFLEX D-9 described in PRODELEC literature dated October 1965, as being selective alkylation of benzene; dielectric constant 2.3. This fluid is thin, like Aroclor 1242. PRODELEC also

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have literature dated September 1966, describing MIXOFLEX D160 as selective alkylation of benzene; dielectric constant 2.3, and thick like Aroclor 1254.

Prodelec suggests both products for cables and capacitors of the metallized paper type and plastic film type.

We, too, know that alkyl benzene is a good dielectric superior to mineral oil quality for the above purposes.

But, it makes no more sense to put alkyl benzene into a fixed paper capacitor than to fill it with mineral oil. This day has long passed--in favor of Aroclor. I told MR. PADOANI that these Japanese capacitors just can't be the fixed paper type and sell for less than G.E.'s Aroclor-paper ballast units. His reply that the Japanese capacitors being imported in Chile are metallized paper instead of the fixed-paper type seems plausible. Whether the dielectric is mineral oil or the similar alkyl benzene or polybutene used in the U.S.A. with metallized paper is not a pertinent point, as far as the capacitor characteristics go. (Obviously, MR. PADOANI would like to have a similar dielectric fluid but with a higher DK; castor oil, if it were nicer to use?)

We discussed known interest in EUROPE, GERMANY and ENGLAND, etc. in metallized paper ballast capacitors. I expressed much doubt that these European units are as low in cost as the new Japanese metallized paper capacitors, selling at evidently forty cents delivered in Chile. MR. PADOANI said that the GERMANS and BRITISH are a "bit heavy". By this he meant that in EUROPE they seem to use two sheets of metallized paper with a sheet of Kraft paper between to protect against shorts. He said the Japanese use only one sheet of metallized paper, implying no Kraft paper is used. This is hard to believe, because of possible shorting.

I asked about possible tendency of the Japanese design to short-out. He said that he has shorted them several times--but metallized paper capacitors are supposed to be "self-healing"--and they did function this way; PADOANI said. If Aroclor were present--on puncture of metallized paper--the chloride ions generated during the arc MAY interfere with "self-healing". MR. PADOANI asked whether epoxide-chloride ion scavenger would help. I said that G.E.'s Pyronol II patent claims that it does; but we do not know any one using Aroclor-epoxide with metallized paper.

Ten years ago, BOSCH of Germany made zinc metallized paper power capacitors impregnated with Aroclor 1242, for 25 KVAR capacitance.

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After six months the capacitance had fallen to 15 KVAR, and finally as low as 10 KVAR. Dr. ASOLA of ITEL in Brazil said these units were no good and were taken off the market. ITEL now have a SPANISH employee who formerly worked for BIANCHI in SPAIN. Dr. Asola said that today BIANCHI use aluminum (not zinc) metallized paper impregnated with Aroclor 1242 for power capacitors. It must be emphasized that these are for relatively low voltage. Dr. Asola also metnioned that the Russians are using metallized paper, no doubt aluminum and not zinc metallized. The liquid impregnant is not known.

Metallized paper capacitors have been around a long time in our country. They present potential threat against Aroclor-paper capacitors, only at low voltage, such as common ballast types. G.E. has long known this, and as ballast is the largest part of their business, they have gone all-out to automate their production and miniaturize designs to hammer out the lowest cost Aroclor ballast units. Their units had also sold for seventy-five cents; but recently sold as low as near forty cents. This process has driven out some former domestic competitors and makes life very hard for AEROVOX, CORNELL-DUBILIER and SPRAGUE, who still try to compete against G.E. ballast.

No U.S.A. metallized paper design has been able to compete with G.E.'s Aroclor-paper units. DU PONT tried metallized MYLAR for ballast, and it has not worked out due to cost. For higher voltage units, Mylar also failed due to thermal effects tied in with low corona extinction voltage levels. Metallized Mylar can be made to work, but it becomes too costly.

We know that the Japanese recently "crashed" our big independent ballast market in Chicago (JEFFERSON and ADVANCED-TRANSFORMER Companies) with ballast capacitors sold at probably very little over forty cents, and perhaps as low as thirty-eight cents, against G.E. It is our impression that these Japanese capacitors are the fixed-paper type using Aroclor 1242 and made by MATSUSHTA, who obtain chlorinated biphenyl at a special low price.

I do recall visiting SHIZUKI in Japan during our market exploration last July, but this matter of Japanese metallized film capacitors for ballast was not encountered in Japan at that time.

Now we know that capacitors of this type have replaced our Aroclor 1242 in CHILE. That the ballast business in CHILE is relatively small is beside the point, and that G.E. and the JAPANESE are the only ones in position to go after this business on a "cut-throat" basis is obvious. We

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seek to know whether G.E., whose ballast capacitor factory is very busy and is being expanded significantly, may merely have found this SOUTH AMERICAN business too unattractive at this time--or whether the Japanese have accomplished an economic "break-through" to allow good quality mettalized paper to compete against Aroclor ballast types. Metallized paper is not regarded a threat against Aroclor power correction capacitors at higher voltage, nor for 1000 volt Aroclor ballast used for industrial lighting in Brazil--which is somewhat a specialty compared with the millions of low voltage Aroclor ballast capacitors used in Brazil for commercial and home lighting.

The following actions are suggested:

1. Obviously, MMK and MJL will explore the SHIZUKI development in more detail than is possible from South America or the U.S.A.

2. Through Mr. Breit of SANTIAGO, we will try to get a few of the SHIZUKI units to probe in St. Louis. Our people in B-A will keep in touch with PADOANI for more information.

3. At various times Mr. Coleman of Ruabon reported about activity of metallized paper capacitors in Europe, England, etc. We would appreciate an outline or summary at this time for review, in light of the SHIZUKI development. Comment on the status of Prodelec's Mixoflex regards metallized-paper capacitors will also be of interest. We have wondered about promoting Monsanto's alkyl benzene as a dielectric for cables, transformers and metallized-paper or plastic film capacitors? It has technical advantages over mineral oil, but these must offset higher cost.

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