ASHRAE Leadership Recall (formerly Leadership Recalled)

Transcription

Interview of: Alwin Newton

Date of Interview: June,1985

Interviewed by: Bernard Nagengast

Note: The original interview has been modified to substitute a professional voiceover for the interviewer Bernard Nagengast. There is a brief introduction to the interview which was not transcribed.
Some of the original audio has been deleted after the interview was transcribed. The missing sections are between the notations Audio Missing and Audio Resumes

Bernard Nagengast
One thing I want to know, Al, I know that you have been in the industry for a long time, when did you start, who were you with and basically what did you do?

Alwin Newton
I became interested in refrigeration and air conditioning when I was at Syracuse University. That probably culminated about 1928 when I joined the student's section of ASHVE, I believe it was, and I did a few research projects for one of the professors, A.R. Achison at Syracuse. Also, I found one project very interesting. One of the managers of a large department store wanted his house air conditioned, and it was too small a job for the big contractors, and too big a job for the people who were doing refrigerators, so I took on the job.

B.N.
This was around 1928?

A.N.
This was '27 or '28, I don't remember the exact date. Believe it or not what we did was put a 15 ton ammonia water chiller system in a depression, or cavity, that we made under his driveway and covered with an iron grate so that if there was a leak it wasn't getting into the house. The chilled water went into an air washer. That was my first air conditioning job.

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B.N.
Was that an automatic controlled job?

A.N.
Oh, yes, it was controlled automatically, he didn't know enough to control it. I saw it in operation about ten years after that so it was still going.

B.N.

That was installed in Syracuse?

A.N.

Syracuse, New York. Before Carrier was there, that was when Franklin Motor Car Company occupied the present Carrier buildings.

B.N.

I guess at that time they were in Newark, New Jersey, weren't they?

A.N.

Frelinghuysen, New Jersey.

Editorial note: Carrier Engineering Corporation was located on Frelinghuysen Avenue in Newark, New Jersey.

Audio Resumes

B.N.

So then after that what was the first work that you did when you graduated and went to a company?

A.N.

I went to the General Electric Company in Lynn, Massachusetts after that. There we had an opportunity to choose some of the projects on which we worked. Carrier funded projects on railway air conditioning with the concept of using a small centrifugal compressor to produce the liquid refrigerant which is pumped between 8 cars in the train with individual units.

B.N.

How did they manage to couple from car to car?

A.N.

That was their big problem. The system never found anything except experimental use. It did work quite well experimentally. It was one of the first exposures that I had to something that was running about 44,000 RPM, and it was back in 1931. We thought that was high speed then.

B.N.

What did you do after that?

A.N.

Generally, I was talking courses at MIT, and I finally graduated from MIT with a masters degree and there I did specialize in heating, ventilating and air conditioning.

B.N.

That was a masters degree in Engineering?

A.N.

Yes, in engineering. I found myself getting married in August of '31 and when I went to MIT full time I was one of five married students, and the only one who didn't live on campus. I lived in Lynn still.

B.N.

So then what did you do after you finally got your degree?

A.N.

After that York Ice Machinery Corporation interviewed several of us at MIT, I was one who accepted. I believe there were five of us who went down to York at the same time. Interestingly enough, we were hired at $120 per month. The first paycheck came in early July, and it didn't look like that and the boss said, "Well, there is probably something wrong in accounting, just wait until the next one comes." The next one didn't look that way either. So, we finally got to one of the top dogs in the company and he said, "Didn't you know we all took a 32% cut after you were hired?" So, we got along on $80 a month for a while. I did get into drafting work, in fact the Air Conditioning Refrigeration News recently carried an article about a fifty year old job in the Humble Oil Building, Houston, Texas, and I designed the water chillers for that. Because I had some heat transfer work at MIT. Nobody knew about heat transfer and Freon, so we used the basic principles to guess at it. And it came out very, very well.

B.N.

That is when Freon was in its infancy because it had only been placed on the market about 1931.

A.N.

I believe that was the first of the large 200 ton size Freon units, and it was expanded from there on. Those were reciprocating compressors, I think, they were 14" X 16" cylinder compressors.

B.N.

Your early work was in the refrigeration area?

A.N.

Yes, although, refrigeration for air conditioning, you see. Humble Oil was a big office building. Then we also did work for all the big buildings in Washington, D.C., at that time. I did National Archives units and United States Post Office's initial designs. From there I went into the development department at York to develop new products.

B.N.

What were some of the products that you were assigned to work with?

A.N.

Mostly in the residential and small air conditioning field because that was brand new and the opening up of Freon gave us an opportunity to put equipment where we never could before.

B.N.

About what time was that, what year did you begin to work on domestic air conditioning.

A.N.

About 1933. In fact, we built an experimental house, which is still exists in York. I stopped by to see the unit and owners a little while back, and they didn't know their equipment or their house was that old. We built it, I believe, in 1933. I gave them a set of plans for the original house. We did room air conditioners. I think York had the first room air conditioner that was actually marketed. De La Vergne over in Philadelphia had the first one with hermetic compressors, they were units that sat in front of a window on the floor with a duct going through a slightly raised portion of the window to get condenser air.

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B.N.

As I recall, the one that York developed had a reciprocating compressor in it.

A.N.

Most all did at that time. The reciprocating compressor that York used was belt driven. The one that De La Vergne used was one of the first semi-hermetics, and it had its problems. They never really did market that unit.

B.N.

That is interesting because I read an article one time on the history of window air conditioners and it was published, I believe, back in the 1950s and I don't remember who the author was but he pointed out that the De La Vergne air conditioner and the fact that it was advertised in the Air Conditioning Refrigeration News, he didn't know whether it actually had been marketed or not. So, you are saying that it never really was successful as a marketing venture.

A.N.

As a matter of fact we hired its designer at York while I was at the development department.

B.N.

Who was its designer?

A.N.

Charlie Neeson. He designed it and he designed the hermetic compressor. I think their biggest problem was that they didn't have any sales organizations to handle that kind of thing. I believe I am correct in that they built 50 units and that is all they ever built.

B.N.

Probably none exist today.

A.N.

That's right. Now, York's BA75, which is the one that I mention. It is a 3/4 ton unit built by the hundreds. It weighted 620 lbs. incidentally. They lasted and lasted. Even recently, say ten years ago, I saw one or two in operation.

Audio Resumes

B.N.

What were some of the development problems that you ran into when you had to work on this end and get something out of that nature?

A.N.

One of the first ones was the fact that any unit like this has to operate well over wide range condensing temperatures, outdoor air changes in temperature rapidly, and so does the load change in the building. It may have to do air conditioning when it is 100 degrees outside, and it may have to do it when it is 60 degrees outside. So, the condensing temperature varies. Refrigerant control became a problem. Condensate disposal became a problem. I think one of the first patents I ever got was on the method of getting rid of the condensate into the air stream. We had to basic patent on that.

B.N.

Was that where you slung it up into the air stream using a condenser coil?

A.N.

Yes, in the air stream and against the condenser coil. And also, a method for getting the expansion valve to work well over a very wide range of temperatures without hurting the performance of the evaporator.

B.N.

Did that unit use a thermostatic expansion valve?

A.N.

A thermostatic expansion valve and an external heat exchanger to produce the superheat. I believe it is the first unit to do that. We have a patent on it. One of my early patents. I have about 215 patents.

B.N.

So, how were you able to overcome the problem with the expansion valve?

A.N.

We worked with ALCO whose standard valve has a super heat differential of perhaps 4 or 5 degrees. It was a very sensitive valve. If you depended upon that kind of a valve to control that wide range it became unstable in many cases, and it would open and close, and open and close, flood back and starve the evaporator. So we added the external super heater, liquid suction gas in such a way that any liquid carried over went against the wall that contained liquid, so it would evaporate. We changed the differential, if I remember right about 25 degrees, much greater, so that it could be stable over a wide range. Its performance at that time was so far ahead of others that it came out a year or so later that it was amazing and it was mainly because of better control, better refrigerant control.

B.N.

So, you had the problems of the disposing of the condensate, the expansion device problem, and what other things did you run into?

A.N.

I would say that those were the biggest problems. We had problems of maintaining good performance of the condenser as the air flow temperature range changed. We did that by just cross over feeding which became a fairly standard way in the industry, and that was the main thing. Of course, noise was a problem. We had to find ways of keeping everything quiet. Another chap by the name of Emil Neubauer and I worked together on a method of mounting, so that we were flexible across the center of gravity with the motor compressor combination. The way aircraft engines used to be mounted, and we made it very quiet.

B.N.

Who comprised the team of engineers that really developed than unit, beside yourself?

A.N.

I would have to include Neubauer for one; Emil Neubauer is no longer living. Charlie Neeson came with us by that time, and he had some ideas that we incorporated. He was not part of the team, but we worked with him. He came over from De La Vergne and he brought a man with him by the name of Reg Wyle who also worked with us. Those were the main people.

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B.N.

So just a small group of people did the whole shebang?

A.N.

Yes. That was much easier then that it is now. Of course we had draftsmen.

Audio Resumes

B.N.

What were some of the other things that you had to research and develop in those early days?

A.N.

We got into the general field of residential air conditioning. To do that York designed and built one of the very early fully air conditioned homes, probably the first one that was designed to be air conditioned. That home still exists in York, as I mentioned earlier. We built a 5 ton air conditioner with an oil burner attached to it so it would either heat or cool, developed an all year automatic control system which worked extremely well. I think sometimes better than what I see today.

B.N.

About what year was that done?

A.N.

That was the next year, that would be 1934. Then right after that a similar house, but for the same purpose was built over in Lancaster Pennsylvania by York and a real estate group over there. It is interesting in a way that we had to build this house, the whole house and the lot cost $16,000. It was a big house. York thought that was a big investment and they were going to rent it to somebody. First they were going to have engineers live in it for a while, say two month at a time, and make notes on how the system worked, and that kind of thing, record the results. Then this theater owner came along and said, "I want that house." I don't know what he finally paid for it, but something like $23,000 or $24,000. The management couldn't see not getting that profit out of the house so they sold it to him with the idea that for a year we could take records. For a year I used to get up most any time of night and go over there and see what was wrong. He happened to sleep in the day and worked at night, and he had all kinds of little things that happened. Most of them were no problem, but he thought they were.

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B.N.

It was something totally new.

A.N.

Yes.

B.N.

Is that house still privately owned, today?

A.N.

Yes.

B.N.

Does it still have the original air conditioning unit?

A.N.

I cannot tell you that. It did have about 15 years ago, but I have not been back in the house since that time. So, from 1934 until the early 70s it had the same unit.

B.N.

That is amazing. It certainly is a very historical piece of equipment. So you expanded into general residential air conditioning, anything else?

Audio Resumes

A.N.

Gradually we got into the big water chillers for buildings and the kinds of units you use in the room when you use them. The biggest thing as far as I am concerned. I saw that there was a great need for control and I persuaded York to let me have a small group to investigate control and write a control manual. I wish I had a copy of that. I don't. But as a result of that Honeywell gets interested in me, and then I went to Honeywell in 1936. I was there for about eight years. I had charge of their refrigeration controls division.

B.N.

I have seen some of the older Honeywell refrigeration, of course they long have been out of that business, pretty much, but years ago they used to make pressure switches and things of that nature. So, you were probably the guy who developed all of that.

A.N.

A great deal of it. We developed them for the commercial refrigeration business, too, used to have walk-in boxes, you may remember some in old butcher shops, and so forth. The wooden ones. Or even metal ones. The big problem there was keeping the coil free of frost when you had temperature levels around 36 degrees to 40 degrees. We developed a method of doing that which was very successful, we did by defrosting on every off cycle instead of waiting until the frost built up. Once in a while we lost a couple of degrees in temperature that way, but we kept the coil efficient and ready to cool all the time.

B.N.

What medium do you use to defrost the coil?

A.N.

Just the temperature of the air. It gets high enough at 36 degrees or 40 degrees. It will do it if you don't start the cycle too soon. We were the first people that developed the scheme of turning the unit off when the temperature in the butcher box got to be the control temperature, but keeping it off until the coil temperature was high enough to defrost it every cycle.

B.N.

OK, in other words when you switched the refrigeration system off the evaporator fan would continue to run and you would have some mechanism to detect the coil temperature and only until it rose to certain temperature could the system cycle back on?

A.N.

That is correct. We call that a Polatron system. It was the standard all over the industry for a while. In fact, it became the Navy standard out in the Pacific. We produced a very simple control for them and they bought them by the thousands. In those portable boxes.

B.N.

All of the earlier systems that you worked on, the air conditioning systems used thermostatic expansion valves as the refrigerant control, but later on at some point the industry switched to capillary tube control on a lot of the air conditioners and certainly window air conditioners. When did that take place?

A.N.

I would say by the late 50's that switch was fairly well along and of course it was done to save costs. It was done also with a considerable amount of degradation in the performance of the unit, except at one particular condition. We are already having problems with that again because as we increase the efficiency of units we are raising the evaporator temperature so we don't have as much leeway for the capillary to make a mistake that we used to have. I see units going back to expansion valves now because of that.

B.N.

Over the years the various things that you did, what do you think your greatest engineering accomplishment was?

A.N.

It may not even be in the refrigeration field. Lately, we have done a great deal in the electronics management of speed control on compressors, efficient speed control on compressors, and I really believe this is going to be one of the most important things that has come down the pike. It allows you to adjust the speed to get maximum capacity, to match the load. In doing this you can reduce the temperature range over which you have to pump the heat and there by affect efficiency improvement. We ran some systems like that which were not electronic way back in the late 40s. There was experimentation between Airtemp and Philadelphia Electric and we were able to get a seasonal COP of over 4.1 approximately, with a basic system that would have given us about 2.2 if it just operated on and off. The potential is there to do it. We may not ever reach quite that high of COP today because we have gone to R22 instead of R12 and have valve losses and thermodynamic losses of probably a little bit greater. We are talking about the old 4 pole motors, R12 type refrigerants so we were there, so we ought to get back there one of these days.

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B.N.

That brings up an interesting point, all the earlier systems that you worked on were refrigerant 12, and of course now air conditioning almost exclusively uses R22 in all of the smaller units, when is it that everybody started to switch to R22 from R12?

A.N.

In the early 50s.

B.N.

And that was for cost reasons?

A.N.

Yes, really. We had given size compressor, we have a 3 ton compressor, let's say, with R12. If I could make that same compressor pump R22 and perhaps increase the motor size it becomes a 5 ton compressor just because of the greater density of the refrigerant. So the mood was there to get more and more out of our compressors. So, changing the refrigerant increased the capacity about 60 percent,

roughly, and then they doubled the speed going from 1750 to 3500 RPM, so you have this same compressor that was a 3 ton compressor is all at once a 5 and then a ten…

B.N.

But all the time we were doing a little bit of sacrifice along the way in efficiency, and maybe noise?

A.N.

Oh, yes we were. Noise and things like that and perhaps life. I had one house where I had a system that ran 36 years, one of the houses that I owned in Minneapolis. I kept track of it after I moved away.

B.N.

This was one of the old systems?

A.N.

Yes.

B.N.

Joe Loveley told me that you have quite a collection of artifacts of old equipment, is that true.

A.N.

Not as much as I used to because I let other people have some. We used to have a gentleman on the West coast who was collecting artifacts. Hy Jarvis and some of the things I had are now out there.

B.N.

What things do you still have?

A.N.

I would have to look to tell you. I don't know, I haven't kept track of it lately.

B.N.

Were the things that you collected mainly in the air conditioning area?

A.N.

Mostly air conditioning. There might be some refrigeration control items and things of that kind. I have one other thing, eventually, I don't know what I am going to do with it, but as I said I had about 218 patents in the refrigeration field. They tell a very detailed story of development. I got the first patents in 1936 or so and they were applied for before then. Close to 50 years. The patents show you the way you were making improvements.

B.N.

I was going to ask you if you could give me the numbers of the patents because I was going to see if I could get copies of them. The reason I ask that is because I have done quite a bit of research into patents in the industry and the thing that I have found is that it is very, very difficult to do patent research from the standpoint of the kind of research that you or I would want to do because e the patent system is not set up so that you can look up all the patents on window air conditioners.

A.N.

No, it is not.

B.N.

No, it is almost impossible to find the stuff unless you know a patent number. Even if you know the name of the inventor you can't get the patent.

A.N.

I have all of these in one volume. So, they do give a sort of a continuity, there might be an early York patent on a room unit, and a later Airtemp patent on a room unit, and different patents on compressors. So, you see what we were thinking.

B.N.

If I can make a suggestion, if you are wondering where a good place is to put that, ASHRAE is in the process of developing an historical archive at Society Headquarters, and one of our concerns is that various members who are still alive get to the point where they want to get rid of it, or don't know what to do with it, and are afraid it is going to be lost permanently that we would like to have that for our permanent record.

A.N.

I have three children, one of whom says maybe she wants that.

B.N.

At the very least if we could get a list of the numbers.

A.N.

I can get you a list of the numbers.

B.N.

It is always nice to have the original.

A.N.

Many of them now would be out of print. I guess most of them are on microfiche.

B.N.

You can get any of the old patents, but you can't get a copy of the full original edition to the inventor, with the cover and all those things. But you can get the text of the patent.

A.N.

I have the complete text. When you work for a company the original usually goes to the company, and then I get a copy, and it is the copy that I put in my record book.

B.N.

Maybe you should write some type of history of the work that you did.

A.N.

That is what I have been told before.

B.N.

If you want to go get that kind of information on early refrigeration you can't do it, because the first and second generation engineers are gone. We still have with us first generation air conditioning engineers and you are an example of that, and the thing is that in another ten or twenty years it will be impossible to get that first hand information.

A.N.

I suppose so.

Audio Resumes

B.N.

I was talking to Frank Faust the other day and I said the same thing to him, it is important that we get the things that you guys remember, the personal things that you did. After the fact you can always go

back and find patents and maybe find an article that somebody wrote, but the thing that you can't get is some of the problems that you faced, how did you solve them, and those type of things.

A.N.

I have about 180 out of the 220 patents, there are some missing, of course. I can certainly send you numbers, patent numbers.

B.N.

Then with the numbers we can always go and get copies of them.

A.N.

You were asking about what I thought were good accomplishments and there is one other thing that I think I will mention because it still needs to have more attention. It was in 1928, I know because I was at Syracuse University when we were dealing with psychometric charts and the air properties, humidity properties they show, we were dealing with primarily a Carrier chart, and I won't go into detail, but it didn't relate everything in the locations, they made properties easy to find. You read up to a directors line and over to a scale and you could never really draw cycles on it. So I created a different psychometric chart and it has been used since by Honeywell and by York and by Acme Industries as their standard psychometric chart, I don't suppose it is now because all that kind of thing goes on a computer, but recently York asked me to develop for them some information on humidity control, and I found that old psychometric chart and one of the best ways to illustrate the path that the load causes temperature and humidity to take, the path that the operation of the equipment attempts to make it both move and then what is the combined effect.

B.N.

So really what you have developed makes it much more easy to understand the process of conversion of heat and moisture.

A.N.

Yes, you can visualize it, whereas most people do not visualize what a computer spits out. They take it as gospel whether it could be or not and make a lot of mistakes, I find.

B.N.

Going back to your early days of work on air conditioning, who else was doing pioneer work in that area back in the late 1920s or 30s.

A.N.

Carrier certainly was.

B.N.

Especially with respect to air conditioning being applied to businesses and homes.

A.N.

Well, they had small units too. I would say that Frigidaire was one of the big ones. They are out of that business almost completely now, I guess. The other GM division was Harrison Radiator. I would have to think about that a little, but those immediately come to mind. Particularly, General Electric with that expansion of their hermetic refrigerator concept. They also worked on hermetic compressors. Westinghouse got into it probably by 1940 or along there.

Editorial note: The remainder of this interview was lost and never transcribed.