Data Pumps International (DPI): 1990-1998

After some time Folke came back with the result that Nokia would not be interested in this deal, and furthermore that the modem business had deteriorated to the point they could no longer support the development group in Largo, so the time had come to disband it. I was not completely surprised by this news, since it had become fairly clear that the days of leased line modems were numbered due to the increasing digitalization of the network, and our efforts to break into the dial-up modem market with the V32 product was not bearing fruit. Neither was I too distraught about the situation since I felt that with the Clarkspur chip and the work I had already done on it, plus the contacts I had in Silicon Valley, at Cirrus and elsewhere, my immediate prospects didn't look that bad. I proposed to Folke that I plus two of the key engineers, Ray Chen and Wes Smith, would take over the modem lab, the modem IP, and the equipment and start our own modem development business based on it. We came relatively easily to terms about this concept and promptly formed the new company Data Pumps International, or DPI in September of 1990. I and Anne Berit plus Wes and Ray were the only share holders, later we also hired David Pearce and cut him in for some stock. We set up shop in one of the buildings that Nokia had leased for the modem development lab and took over their lease.

This was the time when the CCD sensor state of the art had reached the point where electronic (digital) cameras were practical and we entertained some thoughts about basing the company around that as a product. We observed that DPI could also stand for "Data Plus Image". In the end we decided that since our expertise lay strictly in the modem field we had better stick with that. We quickly put together a technical proposal to Cirrus Logic, pretty much formalizing the discussion I had already had with them about a joint development project based on the Clarkspur chip. We made the agreement to develop the data-pump for a V22/FAX modem chip set consisting of one digital chip (the Clarkspur DSP) and one analog chip. At that point we were able to hire David and retain Gunnar Holm as a consultant, so we were now a team of five full-time engineers.

Since the analog chip was something none of us had any expertise on, we were fortunate in being able to interest Gunnar Holm in joining us and his extremely innovative approach to the Sigma Delta analog converter turned out to be a key reason for many of our subsequent successes. We contacted Crystal Semiconductor about developing the chip and their VP Engineering, a guy named Eric Swanson, came to check us out to see if they should do business with us. Gunnar presented his design and made a great impression on Eric when he explained his mosquito filter idea. (According to Gunnar his idea was based on the low pass filters in the mosquito light, heat, and CO2 sensors by which they find their way to their targets). This approach reduced the hardware in the chip by at least a factor of two at the cost of a slight addition in digital processing. This clever approach helped convince Eric that Crystal should go for the business, but it also didn't hurt that, as he said, we had the right kind of surnames. It turned out

to be one of the most successful chips in the history of Crystal semiconductor, mainly because it combined flexible performance with the smallest silicon area of any AFE chip in the industry. As late as 2000 it was still the most cost-effective AFE available. Gunnar made his deal with Cirrus strictly on a royalty basis that capped out at around 300K and I thought that it was unwise of him to spend all his time negotiating about the royalty terms when he should have tried for some quick up front money. It turns out the only thing he did wrong was to accept too low a cap.

As we started the Cirrus development I had some work left to do on the FAX modem for Ricoh that I had promised Yagi I would finish. This took away some of my time from the Cirrus project, which in hindsight was probably the wrong thing to do, because we missed the deadline which had an incentive of $200k riding on it for me and another 150K for the team, and all I got was about 50K for finishing the Ricoh code. However, it is doubtful that the time spent on the Ricoh project made the difference. Our target, as usual, was too optimistic.

After we had concluded the agreement with Cirrus Logic, Kenyon started to look for a business manager to run the modem business at Cirrus. I tried to suggest my friend Bill Nicholson who was the guy that put me in touch with Kenyon in the first place, but for some reason he was not chosen. I think Mike Hackworth, the Cirrus CEO, had some questions about Bill's effectiveness as a businessman. So Kenyon picked George Urbani, a former Rockwell marketing manager and asked me to evaluate him. In effect I was asked to interview the guy who was to become my boss. I couldn't come up with any reason to turn him down, although I thought he was a bit of a bullshitter, and not very likeable. These were subjective judgments that I didn't feel strongly enough about to advise Kenyon, not to hire him, so he did.

Obviously, our permission to take over the Nokia lab and IP was crucial in allowing us to establish DPI. Another thing they did for us was the extremely generous severance package they granted us, so that all three of us were able to work the first six months without taking any salary out of DPI. As we got into the project a little further it became obvious that we needed more help so we wound up bringing another ex-Nokia guy, the technician Joe Mulcahy. The other Nokia engineers found jobs at Home shopping Network where some manager had decided they needed their own DSP capability. Unfortunately, this did not last long, and those people were soon on the street looking for jobs.

During the closing days of Nokia in Largo we had been working on a proposal to supply thousands of modems for a US Army contract. There were four or five prime contractors bidding on the job and we bid the modems as sub to two of them, Sylvania and CSC. When Nokia closed up shop I sent a letter to them saying the proposal was now coming from the new company DPI and the terms and conditions were all the same. When Cirrus found out about this deal they had huge concerns about how we could handle it and how it would impact our

development project. Fortunately, it turned out that the contract was given to one of the other primes so we were never called upon to deliver.

The DPI development project was, as the name of the company suggests, only for the data-pump part of the modem, so we needed the second part, the control code, from some other source. We were aware of two sources, Spectrafax in Naples and R Scott Associates (RSA) in Raleigh. We had bought the control code from RSA in the Nokia V32 project so we were familiar with them. The RSA engineering VP, a personable and smart englishman by the name of Paul Sawyer came to make the technical presentation and talk about possible terms and conditions. I remember trying very hard to understand the architecture of the RSA code as Paul described it, trying to relate it to the data-pump architecture I was used to, and being unable to understand it enough to appreciate it. Consequently, I was left with the impression that it didn't hang together too well, it certainly wasn't organized the way I would have done it (which was clearly a better way), but since they were in the business and had many implementations running in production modems I was not prepared to question their approach too much.

To check out Spectrafax, Urbani and I went to Naples to see the operation and talk with the management. They wound up giving us a proposal, but since they did not have the package on the shelf, as was the case with RSA, their price was significantly higher so we selected RSA

With that deal consummated we had, or rather Cirrus Logic had, a four-way modem development project going with Clarkspur as the DSP chip designer, DPI as the data-pump code developer, Crystal Semiconductor as the AFE developer, and RSA as the control code supplier/developer. Actually it was five, because Cirrus Logic engineering had to develop their own version of the Clarkspur chip, including some memory modifications needed to accommodate the control code. That Kenyon was willing to take on this kind of project is probably an example of the freewheeling approach to risk that has served Silicon Valley in general, and up to that point Cirrus Logic, so well. Ultimately the whole project was brought to a successful completion, but not on the schedule planned. Still, it became the industry's first single-chip data-FAX modem.

As the project progressed, Cirrus decided to bring the different contributors in under the corporate umbrella, and in relatively short order acquired both RSA and Crystal Semiconductor. I remember visiting Cirrus and meeting three Crystal executives in the lobby and realizing they were there to talk acquisition. I had the same experience about a year later when I was part of Cirrus and met David Lyon in the lobby, who was then there to talk to Cirrus about his company PCSI. All these acquisitions which made a bunch of engineers and entrepreneurs quite rich were in support of Cirrus' push into communications product which was initiated when Kenyon went ahead with the modem development project with DPI. After doing the RSA and Crystal acquisitions, Cirrus made the acquisition

proposition to DPI as well. The term sheet did not include any cash or stock for the company, but it did include generous relocation benefits (the proposal was to merge the DPI with RSA and move the group and all equipment to Raleigh) as well as substantial stock options tied to the performance of the modem business. We basically accepted the deal as offered, with a few minor improvements, which I negotiated in an unpleasant way with Urbani. His negotiating style was to intimidate with threats and nasty personal attacks that made you ashamed that you weren't satisfied with the deal.

Cirrus Logic: 1992-1998

RSA had been purchased from the founder Richard Scott by Munther Qubain who had joined the company as an engineer. Munther is a Palestinian from Kuwait who came to this country in his early teens when his family immigrated here. His father and uncle were both successful businessmen and this quality appears to have carried on with Munther. He is a shrewd business man, an excellent salesman and a patient negotiator who also has a great understanding of the technology of communications. As the owner of RSA he built up the business to a 30-man organization that was selling modem control code to dozens of customers worldwide. He is also a very personable and thoughtful guy who is always ready to help, and to involve himself in your problem. At times this can be too much of a good thing, because he is also very determined that you should do it his way. The deal he had negotiated with Cirrus was a price of $5 million, with a part in cash up front and the rest on an earn-out formula. At the time he was a single guy in his early thirties and free to spend his money any way he wished. So he took the opportunity to upgrade from a single engine airplane to a twin, a Cessna 416, and his car to a Mercedes. After the acquisition of DPI, the organization at RSA was as follows: Munther was president, Paul was manager of the control code, or layer-2, group, and I was manager of the data-pump, or layer-1 group.

At RSA we continued to develop data pumps, going from the V22 data FAX modem to the V32 data FAX modem and the V34 data FAX modem and then finally the V90, with bit rates going from 200 bps to 9600 bps 28,800 bps to 53,000 bps. For each of the new modem generations additional DSP horsepower was required and the Cirrus silicon engineers under the direction of Shahin Hedayat kept making the chip bigger (i.e. more capacity, not larger geometry), faster, and cheaper, so all my team had to do was to keep developing the new signal processing code. The AFE chip with Gunnar's mosquito filter continued to support whatever modem spec we were trying to meet. A truly great design! Bravo Gunnar! The only problem in our relationship with Cirrus management was that we were always late. We came up with good products, but not on the time schedules required by marketing, and which I had committed to. We were especially late with the V34 modem because we were so busy finishing the V32 that we had no resources left over for participating in and learning the

revolutionary new techniques to be incorporated in the V34. We kept trying to hire key engineers from competitive companies but without success. Finally we were able to snag Guozhu Long and Sanjay Gupta from Codex, after they were finished with the V34 project there. It was one of my failures as a manager that I wasn't able to hire a couple of good modem engineers so that I could have freed up Wesley and or Ray to work on the V34 issue. I could have tried to delve into the V34 stuff myself, but I was too scared, both of the technology and of taking that much time off my management task.

In spite of our late start the V32 version of the modem started to rack up quite respectable sales numbers. It was quite a thrill for me when we reached the first million units shipped and Kenyon and Hackworth were also impressed. Plaques made from the Cutlass wafer (code name for the DSP chip) were handed out to the team members and I together with Urbani and Shahinn were invited to the 100% club where we were a much appreciated part of the entertainment.

In addition to the data-pump development projects we took on some supporting tasks for the new Cirrus subsidiary, PCSI. PCSI had been founded by an ex Intertel engineer named David Lyon, whom I had known back in the days of Paradyne. (In fact, we used a technique he had published for establishing symbol synchronization in the V27 modem there.) I was very flattered to be relied on as the modem expert by David in their development of a new exciting product. The concept was cellular phone with data capability which PCSI had conceived of and started talking about. The Apple Newton had just come out and the idea of combining such a device, (Personal Digital Assistant, PDA, as it was called) with Cellular communications was simply irresistible. Companies like Sony were hovering around PCSI hoping to be the first to use their ideas to bring a product like this to market. The communications medium was to be something called CDPD (Cellular Digital Data Packet) which used some unused bandwidth in the AMPS mobile phone system for digital data. The ambitious set of capabilities in this type of product, conceived in 1992, was not to be fully achieved until the arrival of PDA type cell phones in 2005. Another example of how the product concept precedes practical products in real markets by many years, decades almost, leaving many opportunities for premature entrepreneurs to lose their stake.

For this kind of product to be competitive it was thought that it needed to have normal analog modem capability as well as the CDPD flavor, and my group was tasked with the project of squeezing modem code into the microprocessor planned for the product.

Because of the high profile of this product and for various other reasons Cirrus decided that RSA should be folded in under PCSI, so for a period we were part of that group. The promise of CDPD phones turned out to be slow in fulfilling, however, and the PCSI revenue forecasts continued to prove excessively

optimistic. Little by little, the different Cirrus acquisitions in the communications market were looking more and more like mistakes.

One of the changes in doing business that PCSI brought was to introduce a structured development discipline. The process was introduced to us in the form of a huge document, a 2.5 inch three-ring binder filled with interminable, repeated specifications and procedures for doing planning, documentation, requirements specification, sign-offs, reviews, approvals, evaluations, etc. I foolishly undertook to try to apply this document to our process but fortunately it turned out to be so tedious that I gave up on it. Had I succeeded it probably would have brought our projects to a complete stand-still, something I saw happen later at Intel.

As Cirrus' business situation deteriorated, partly because of an inability to integrate all the different companies and technologies that they had brought into the Cirrus tent, reorganizations and project shuffling grew ever more frequent. One configuration I remember in particular was a joint project between our group and a team at Crystal in Austin to develop a single-chip T1 bulk modem. This was a device which would connect directly to the T1 digital stream, demultiplex it and execute the modem function on each one of the 24 channels. Naturally, all the multifarious modem standards had to be supported and operable on each channel independently from all the others. The market for such a device was primarily the ISPs who needed to accommodate the millions of internet users who were starting to dial into their servers. A company called Ascend Communications had got there first and was experiencing the kind of meteoric growth that entrepreneurs dream about. This project was a case of deja vue for me; during the final year at Nokia I had spent a reasonable amount of money and effort to determine if there was a market for such a modem. I had envisioned it as a useful element in ISDN networks and kept trying to get validation for this concept by talking to phone companies and other ISDN gurus. The technical idea came from Gunnar Holm, and he and I did a reasonable amount of investigation and evaluation of the technical issues involved and were satisfied that it was a doable thing. I did a fairly feeble job of pushing this idea with Nokia, mainly because I could not get warm feeling about the potential in the ISDN scenario. And, of course, none of us had any inkling of the Internet boom that was just a couple of years down the road.

The project, code named Python, was divided into four basic teams, the silicon guys, the system software team, the data-pump team, and the control code team. The silicon and system software activities were in Austin and the data-pump and control software in Raleigh. As usual, I was suspicious of the system software guys, thinking that they probably didn't understand hard-real-time requirements and would likely load it up with a bunch of useless cycle-eating and space-consuming code. I tried to do a kind of seminar in a tele-conference on my ideas for a real-time executive. I don't think it impressed anyone.

One day when I was visiting Cirrus in Fremont, the marketing team was buzzing about a new modem type with up to 56 kbps speed. It had been considered a given that the 28.8 kbps speed of the V.34 was pretty much the limit for voice-band modems. The envelope was stretched there about as far as it can be stretched. So how come people are talking about doubling the speed, what are they smoking? In listening to the stories I picked up that they were talking about T1-bulk modems operating directly on the digital bit-stream of the channel. Then I realized what the trick was: that bit-stream has 56 kbs data rate available for the customer data and if appropriate coding tricks are used the random sequence of customer data bits can be turned into a sequence of bytes to the customer's CO that get sent over the local loop as a sequence of analog symbols that should be detectable by a suitable decision algorithm. The only trick is to make sure that the resulting analog wave form doesn't contain characteristics (such as too much energy at DC which can't get through a transformer) that are unsuitable for the local loop and analog front end. I felt proud of myself for latching onto this concept so quickly, but also had to acknowledge that I had failed to come up with the idea in the first place. Both USR and Rockwell had products almost ready to go and we were caught completely flat footed. The two companies used slightly different techniques for the coding and were competing to sign up licensees to generate as much momentum as possible behind their approach. We elected to license the USR technique that went under the name X2. K56Flex was the Rockwell standard. The CCITT modem group came up with a standard, called V90, that departed significantly from both of the proprietary schemes, so presumably everyone was satisfied, if not exactly happy. We had tremendous pressure from marketing to release a product somewhere close to the competitive releases and I signed up to try but asked that I be allowed to offer significant monetary incentives which George Alexy, the marketing VP, agreed to. The benchmarks of achievement were not well enough specified, however, with the result that the bonuses were actually earned but the product was not ready for release. Alexy was man enough to step up and say that he had approved the whole deal, but he could easily have blamed it on me, since it was really my responsibility set up this kind of incentive scheme in the proper way.

The engineer we had to lead our V.90 was a woman named Veda Krishnan whom I had hired from Racal. I had contacted her a couple of years earlier to get her to come and help us develop the V34 modem, but was turned down. She was a very well-known and respected engineer who totally earned her reputation. She was extremely smart, very creative, and had an excellent work ethic. At Racal she was credited with many innovations and patents that earned her a high-profile position in the company. However, when Racal was phasing out the modem business she finally deigned to join our company, but only on the condition that we hire her husband also. We did not see him as a good fit for our group but since we really wanted the lady, we gulped and made them both an offer.

About this time the idea of DSL modems was in the air and we had discussions with the silicon guys in Fremont about the kind of DSP engine needed for this application. It basically required an order of magnitude increase in processing power which certainly tended to scare me off, plus there was the requirement for a brand new type of AFE also with extremely ambitious specifications. Combining this with the whole new concept of signal processing using FFT techniques caused me to view this project as so big and uncertain that I didn't know exactly how to estimate it, but I suspected it would require huge resources. I also had my doubts that we had the necessary expertise in house handle all the new stuff. As a consequence we didn't ever produce an actionable development plan that Kenyon could take to his management to get the go-ahead. Because of Cirrus' increasingly unfavorable business performance, to which the modem business added its contribution, it became hard to look forward to bold new initiatives. The situation got to the point that the board decided that Cirrus needed a new president and replaced Hackworth with a mid-level business manager from Analog Devices by name of David French.

At about the same time, the modem marketing manager, Frank Reo, resigned and went to work for PC-Tel, one of our newest and most alarming competitors. The alarming thing about them was that they were selling a soft modem, i.e. the DSP algorithms were running in the PC which eliminated the need for DSP hardware, with consequent reduction in cost. This was a concept I resisted to the bitter end, basically because it eliminated the thing I was most interested in (DSP processors and code) and replaced it with something I was unfamiliar with: PC software and Windows. To help guide us in the modem business Cirrus hired a man named Fred Schuckert as a consultant, a position that was converted to full-time Business Development Manager fairly quickly. Schuckert was a completely new name to me but he was in fact a veteran in the modem business, having founded the modem company Creatix in Germany and grown it to 80 million in sales before selling it after some money losing ventures in the US. With this background he had contacts in much of the US modem industry, primarily the end-user modem part of it rather than the chip makers. His company had at one time supplied modems to the communications group at Intel, among others. At first meeting, Fred did not come across as an impressive guy, soft spoken, fairly laid back, and rumpled looking, but this appearance proved deceptive after further association. The other change in the business end was the arrival of a new sales manager, Clement Lam, who had held sales and marketing jobs at a couple of other PC oriented start-ups in the Valley. Both Clement and Fred also had good contacts in Taiwan.

As the new president got his footing at Cirrus he started to make the moves that he hoped would improve the business and lead to a recovery in the price of CRUS common. His basic strategy was to focus Cirrus narrowly on the analog/digital conversion related business, codecs, audio chips, etc and to divest all the other non-audio related businesses, most of which were not profitable at that point. Consequently the modem business, as well as an ATM controller and

Interface group (Basis Communications) and a scalable processor group (Cradle Technologies) were all put on the block.

End of Part 6

Back

State of Florida

Department of State

I certify that the attached is a true and correct copy of the Articles of Incorporation of DATA PUMPS INTERNATIONAL, INC., a corporation organized under the Laws of the State of Florida, filed on July 16, 1990, as shown by the records of this office.

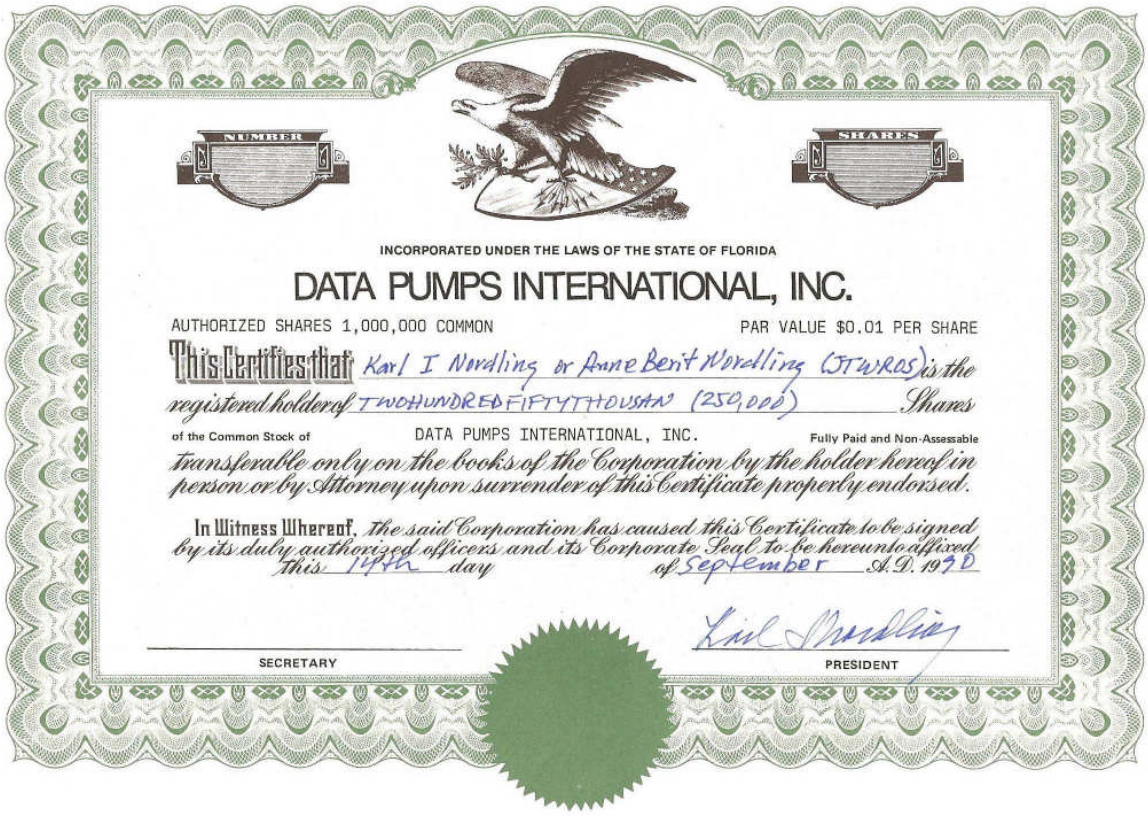
The document number of this corporation is L87265.

Given under my hand and the Great Seal of the State of Florida, at Tallahassee, the Capital, this the 17th day of July, 1990.

Jim Smith
Secretary of State

CR2E022 (8-89)

Back



NUMBER

SHARES

INCORPORATED UNDER THE LAWS OF THE STATE OF FLORIDA

DATA PUMPS INTERNATIONAL, INC.

AUTHORIZED SHARES 1,000,000 COMMON PAR VALUE $0.01 PER SHARE

This Certifies that Karl I Nordling or Anne Berit Nordling (JTWROS) is the registered holder of TWOHUNDREDFIFTYTHOUSAND (250,000) Shares

of the Common Stock of DATA PUMPS INTERNATIONAL, INC. Fully Paid and Non-Assessable

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and its Corporate Seal to be hereunto affixed

This 14th day of September A.D. 1990

SECRETARY

PRESIDENT

The DPI office in the Nokia building on Tall Pines Drive

Back

Back

DPI
Data-Pumps International, Inc.

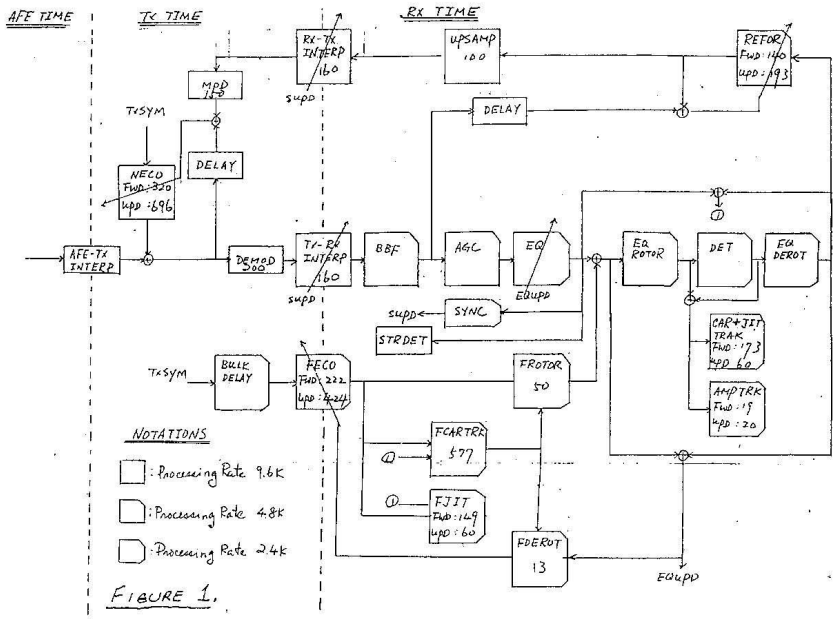
2210 Tall Pines Drive, Suite 204
Largo, Florida 34641 · USA
Tel: 813-538-2790 Fax: 813-538-2694

2. PROCESSOR REQUIREMENTS

The increase in processor requirements is primarily due to the echo canceler, so the following analysis focuses on the added capacity that it requires.

2.1 Signal flow with time-base boundaries

The signal flow chart in Figure 1 shows the main DSP functions of the V32 modem. The numbers in the different functional blocks indicate the number of cycles per symbol required to execute the function. Figure 2 shows the same flow charts, but there the numbers indicate the DSP RAM useage in words.

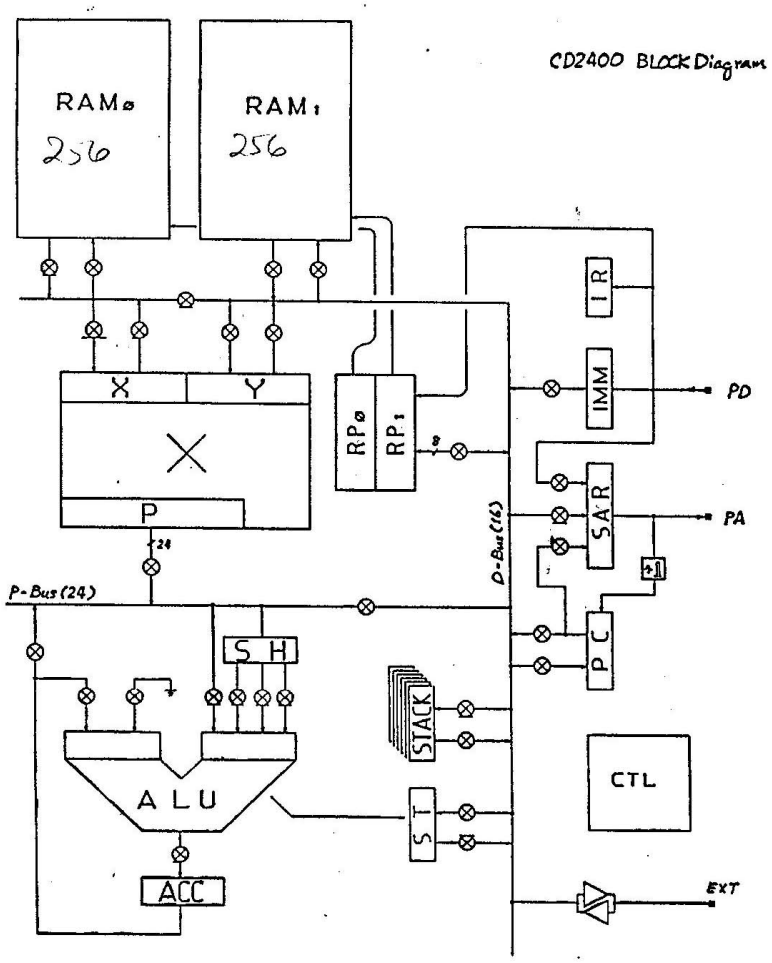


Technical proposal to Cirrus for the V22-FAX modem

Back

8/20/88

Clarkspur Design
999 Saratoga Ave. #10
San Jose, CA 95129
Phone (408) 253-3196



Block diagram of the Clarkspur DSP chip

The DPI team plus two engineers from Cirrus. From left: Mr X, Tushar Rath,Wesley Smith, David Pearce, Karl, Gunnar Holm, Ray Chen

Back

George Urbani, modem Business Development Manager for Cirrus

Back

Back

CIRRUS LOGIC, Inc., 3100 West Warren Avenue, Fremont, CA 94538 Telephone 510.623.8300 FAX 510.226.2220

CIRRUS LOGIC

Karl I. Nordling
President
Data Pumps International, Inc.
9280 - 119th Avenue North
Largo, Flordia 34643

July 14, 1992

Dear Karl:

This Letter of Intent and the attached Term Sheet set forth proposed terms for an acquisition of the minority interest of Data Pumps International, Inc.(DPI), a Flordia corporation by Cirrus Logic, Inc. a California corporation.

The purpose of the attached Term Sheet is to summarize understandings reached as a result of the preliminary negotiations regarding the Acquisition. The foregoing intentions may be revised and new issues presented upon further investigation.

This letter of intent will remain in effect until terminated. This Letter of Intent may be terminated by either Cirrus Logic or DPI upon written notice to the other at any time until a definitive Acquisition Agreement has been executed by all parties thereto.

Please sign the attached signature page and return it to me by Wednesday July 15, 1992.

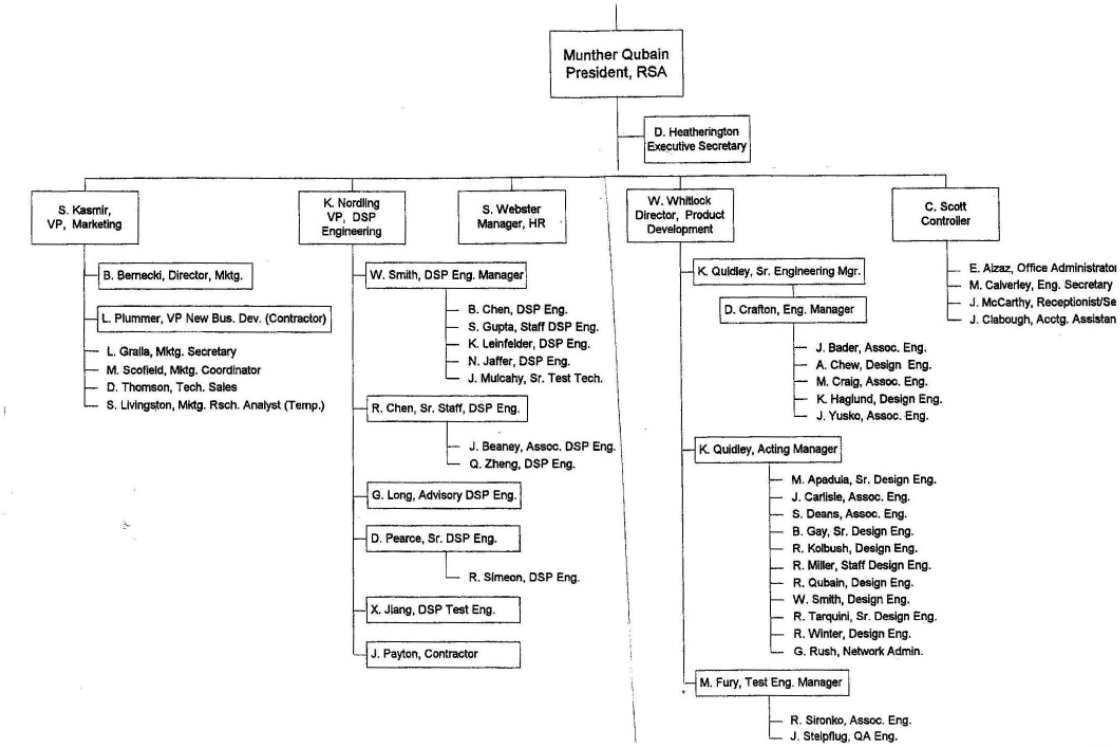
Sincerely,

Sam S. Srinivasan
Vice President - Finance
Chief Financial Officer

enclosures & attachments

cc: Michael J. Danaher, Esq.

Organizational Chart



RSA org chart at its maximum extent

Back

Shahin, Urbani, Frank Reo and I bringing in the bacon to the 100% club festivities.

Back