

The Signal

OFFICIAL MAGAZINE OF THE COLLINS COLLECTORS
ASSOCIATION * Q4 2013 Anniversary Issue *

Rockwell
Collins

- 1971 to Date -



Pro-Mark™ KWM-380 transceiver

\$7.50 USA \$8.00 Canada 700 円日本

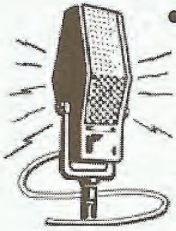


The Signal Magazine

OFFICIAL JOURNAL OF THE COLLINS COLLECTORS ASSOCIATION

Issue Number Seventy Two - Forth Quarter 2013

Join Us on the Air!



- Sunday 14.263 mHz at 2000Z
- Tuesday 3805 kHz at 8pm CST
- Thursday 3805 kHz at 8pm CST
- Friday (West Coast) 3895 kHz at 10pm CST
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- 1st Wednesday AM 3880 kHz at 8pm CST

Sunday for Technical, Buy, Sell & Swap
Tues., Thurs., Fri., & Sunday for Ragchew

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- Holiday Greetings -

To Our Membership & the People of Rockwell Collins

The membership of the Collins Collectors Association - and its management team - would like to take this opportunity to say "Seasons Greetings and a Very Happy New Year" to all of the employees of Collins Radio and the Rockwell Collins Corporation.

We hope that all of you have a wonderful and safe holiday season and that your 2014 is rewarding and fruitful.

This issue is the last (post Rockwell) issue of the four part series that we hope has served to document some of the great history of Collins and Rockwell Collins. We hope that you have enjoyed the stories as much as we have enjoyed working with the many retired and working Collins, and Rockwell Collins, employees.

It has truly been a privilege working with all of you, and all of us have, in one form or another, expressed our pleasure in getting to know many of you for the first time, and working with you during the research that led to some of these stories. They are your stories, and you should be proud of them and your history.

This issue particularly is dedicated to all of those that "weathered the storm" and then proceeded to help make the turn-around of Collins Radio a success. It is also dedicated to the Rockwell management who had the vision and perceptiveness to see the inherent value in the heritage and ethic of the Collins Radio Company while it was struggling.

This dedication should also rightfully extend to Arthur Collins. Without his vision, leadership and enthusiastic pursuit of excellence, the company would have never arrived at the 1972 juncture with Rockwell.

As it says in the Post Rockwell article, the Collins spirit prevailed and fate smiled on a great company. May that continue!

the CCA Board of Directors

A Quick Look in This Issue

- Feature - The Rockwell Years
- We hear from those who were there
- The 51 Year Wonder Project - TACAMO
- Significant Contributors to the Bottom Line
- 2013 CCA Business & 2014 Outlook



FROM THE STAFF

by Bill Carns, N7OTQ & Don Jackson, W5QN

From the Desks of N7OTQ & W5QN

What a year! What started out as a vision (To tell the Collins Radio story), turned out to be a wonderful and educational journey.

When we here at the *Signal Magazine*, and the CCA Board of Directors, discussed doing four anniversary quarterly issues that focused on the four eras of Collins history, the idea had yet to take solid form. When we closed out 2012, the *Signal Magazine* was running 24 pages, and we all were pretty happy with the membership's acceptance of the content and the impact of the work.

All of us, including the editors, envisioned a result that was similar in size, but with a more (for the 80th anniversary year) standard format and content . . . content that would tell the Collins Radio story of the era, the equipment, the people, and the business.

Little did we know that, by making that decision on content - and by aiming more generally at telling the story adequately, that we had just relinquished control over the magazine, and turned that control over to the "story" itself.

Following the Q1 Prewar Issue (which quickly rose to contain 32 pages), we realized that we had lost control. Some good discussion, and reminders about budget and workload, resulted in a decision by the board to "invest" a bit in the magazine for 2013 and continue to tell the story as it should be told. Fortunately, the CCA was, and is, in a financial position to invest some funds in the effort. That is one of the things that we hold reserves for. In 2014, the magazine will return to its normal size, and the budget will again be balanced.

Something else happened along the way too.....and this could not make us any happier. When the efforts to tell the story of Collins' history started, there was a small but enthusiastic core of people that took on the job of doing the research required to get the facts and stories straight and documented. We all soon realized that, not only was there this intriguing job to do (almost like a puzzle to solve), but we - the research team - were going to be learning a whole lot (always fun). We also realized that we were going to need a LOT of help.

We reached out to a multitude of retirees and current employees who had participated in the story - folks that had actually lived it - or at least folks that knew first hand stories. These people, in many cases, were retired, had moved from Cedar Rapids, and were in the far corners of the country. Many had lost touch with their peers of years ago.

Then the miracle occurred. These people - without exception - became excited about recovering, and telling, the history of the company and its people. In some cases their memories were foggy and only partial stories emerged. In many of those cases, these people reached out to talk with others that were involved. More names emerged. Slowly, but surely, the number of contributors multiplied. But....more importantly, those folks that had lost touch with peers started talking on the phone, and then visiting. The circle widened and multiplied. The social impact of doing the research was astonishing.

We can only smile at the fact that the magazine and our efforts here have served somewhat as a catalyst - and made phones and doorbells ring. We had no idea what we were starting when we began.

All of us can't thank all of you enough for the joy of working with quality people and for the privilege of sharing in your story . . . As well as for the opportunity to learn more about a wonderful company. Never have I seen such a conglomeration of quality people and families. It is heart-warming.

Looking at the experience from another perspective, the last 12 months research also speaks volumes about Arthur Collins. He not only built and led a culture that fostered technical and quality excellence, but he had a unique ability to find and hire (and then motivate) quality people. . . . Quality family oriented people!

Like we said....The vision has become a journey, and we are pleased to say that it is not over. As a result of the people met, and the stories unfolding, we will all continue to share this journey for the rest of our lives.

For the entire staff of the *Signal Magazine* and the CCA management, We would like to wish everyone a safe and very joyous holiday season.

Our Best 73s - Bill, K0CXX/N7OTQ & Don, W5QN

email: wcarns@austin.rr.com



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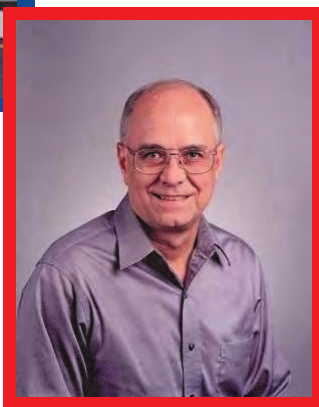
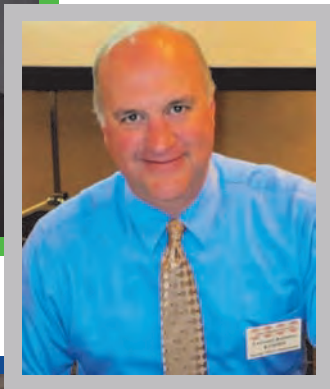
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The *Signal* visits several shacks brimming with Rockwell era equipment

52 PRESERVING HISTORY

We relive - and preserve - the past with the presentation of this KWM-380 ad

OUR CONTRIBUTORS



Loney Duncan, W0GZV

“Fifty One Years of TACAMO” *page 10*

Loney joined Collins Radio, Cedar Rapids, in 1957. He served in Engineering Development & Line Management before becoming Division Director of HF Equip. & High Power Transmitters. After moving to Dallas in 1969 in this capacity, he was promoted to VP, Electronic Technologies & Processes reporting to R. Cattoi, Sr. VP of Engineering. He served under Bob Wilson and then Don Beall for many years - retiring in 1998. He is an avid Collins preservationist.

Lawrence Robinson, KC0ODK

“Avionics—Then & Now” *page 20*

Lawrence is currently the Curator of the Rockwell Collins Museum. He also is a Sr. Engineering Manager in the Government Systems Group at Rockwell Collins. His experience includes spending most of 2004 at Boeing in Seattle, Washington representing the Rockwell Collins Corporation on the Joint Development Phase Team for the 787 Dreamliner.

Scott Johnson, W7SVJ

“UHF at Collins”, *page 24*

Scott has written for the *Signal Magazine* in the past and is very “Welcome Back”. He is a significant collector of Collins avionics and military boxes, and operates a prolifera of this equipment. Professionally, he is an engineer, but he has also run FAA approved avionics repair facilities for the Air Force and for his own business. In addition, he is a Certified C-130 flight Engineer and a pilot, so he brings a very interesting perspective to this subject.

Rod Blocksome, K0DAS

“HF-80 . . . My Story”, *pg 30*

Rod retired from Rockwell Collins engineering where he had worked as project lead on several HF-80 PAs. As past curator of the Rockwell Collins Museum, he is passionate about all things Collins. Here he shares his personal experiences with the HF-80 project as well as those times at Collins. He is still very active with the HF-80 systems in use today - as well as with RC Museum related projects.

Dave Berner, Retired Rockwell Collins

“Concept to Market, HF-80 & Casper”, *pg 36*

Dave Berner, BSEE Communications, served Collins, and Rockwell Collins, for 34 years before retiring in 1997. He was the Product Line Manager for the URG I & URG II and also responsible for planning the HF-80 program and CASPER, the code name for the KWM/HF-380 and HF-280 series development. He lives with his wife Pat in Saint Louis, Missouri where he is very active with the Lutheran Church. Welcome to the *Signal* Dave!

Don Jackson, W5QN

“30L-1 Instability?” *page 28*

Don Jackson shares some of his technical knowledge and drills down on one of the mysteries of our famous little amp. His work always reflects his thoroughness.

HF-80

MY STORY

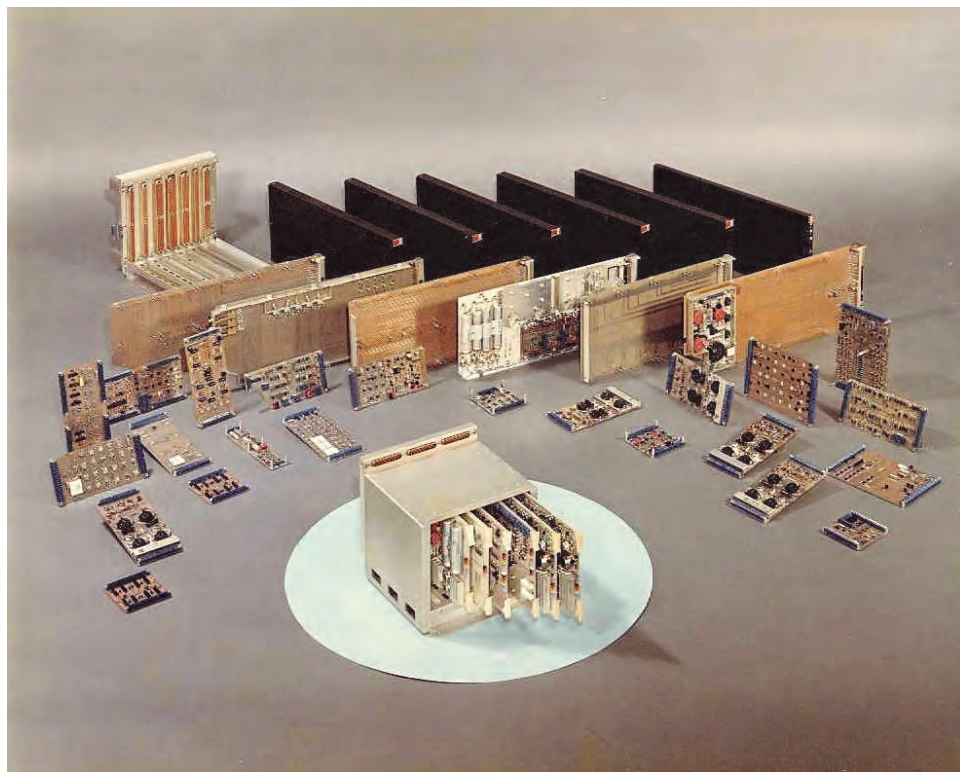
Background

In January of 1974 I returned to Collins after an extended leave of absence for military service and a year of graduate school. During my absence Collins Radio Company had gone through a dark financial period and was now emerging as the Collins Division of Rockwell International. By some stroke of fate, I missed all the trauma at Collins during those years and at the same time accumulated a wealth of experience in USAF Communications Systems (much of it using Collins equipment) and a fresh MSEE degree. My earlier experiences at Collins Radio had convinced me that this was the company for me, and further - that I wanted a crack at joining the HF design engineering department. After my return, this was exactly where I found myself - in the HF Power Amplifier group of the HF Engineering Department headed by Dennis Day, W0ECK.

Years earlier I had met Dennis and several other seasoned HF design engineers and was impressed with their knowledge and skills, and particularly their willingness to take time to explain details and answer the many questions of a new hire fresh out of college. Now reporting back to work, I was given a desk in an office shared with Syl Dawson, one of the seasoned HF design engineers. For the first couple weeks, I studied the instruction books on current production HF PAs - and visited with Syl. Soon a desk opened up out in the department "bull pen" and I was moved out there with all the other junior engineers.

The "ISB" Design & Development Project

As the months went by I was assigned a project to redesign the control systems of the 208U-10A 10kW HF PA. This transmitter is automatically tuned with four servo motors. I had to learn servo control theory quickly and was told to go visit with Chuck Anema - the engineering expert on servo tuning. Many months later I had a prototype system designed, built, and working in the lab. The estimated standard cost of my design was \$3,300 compared to \$15,000 for the system it replaced. My boss, Marv Heidt, had the company photographer shoot the following photo to "sell" my prototype PA control design.



LEFT: An internal promotional photo from the period. We see the components of the older design laid out behind the small enclosure and PCBs of the new design

This caught the attention of engineering management who had been busy planning a secret ground-up design of a completely new family of HF products for ground communications systems. Others besides Dennis Day involved in the extensive planning were Dave Berner, Futures Planning & Program Manager, Jerry Carter, assigned Program Manager after program approval, Ed Rathgeber, Program Manager after HF-80 introduced, Maury Vandewalle, Marketing Manager, and Gary Jost, VP & GM. This was to be a large project, funded by the company, so extensive market research was conducted and detailed business plans as well as engineering design plans were written starting in January 1975. The project was approved by Senior Management and I well remember the engineering kick-off meeting (organized and planned by Dave Berner) led by Dennis Day and Dave Berner that was held on May 1, 1975 in the upstairs conference room of Building 107.

Here was revealed the complete engineering plan containing design requirements, equipment specifications, funding levels, schedules, cost targets, and project assignments. The project was to be kept "Company Private" and was simply referred to as "ISB" which stood for Independent Sideband. The reason for all the secrecy was to accomplish a market coup against our strongest competitor - The RF Communications Division of Harris Corporation. I remember Dave talking at length first how important it was to keep the whole project quiet and secondly the critical design features we needed to achieve in order to be competitive. Some of these early features that I recall were:

HF-80 Design Objectives

- Commonality of Subassemblies and Components
- Building Block Equipment Components for Flexible System Configurations
- Plug-in Cards and Modules for Easy Maintenance and Logistics
- Automatic Tuning
- Remote Control over Phone Lines

- Built-in Test
- Recurring Cost Targets
- High Performance Technical Specifications
- High Reliability
- Address the International/Commercial Markets

Dave had a slide that I will always remember (and he used it frequently) as he continually worked to change the cultural mindset of HF engineers in order to make ISB a technical and financial success. It showed a house fly in the center with a large steam roller labeled "Collins" coming to smash the fly from the right. But on the left was a fly swatter labeled "ISB" coming down on the fly. The implication was use a carefully tuned technical and cost effective "Fly Swatter" approach instead of the typical "Make it as good as you possibly can."

Toward the end of the meeting, the engineering assignments were shown. There were to be four design teams lead by four Project Engineers: Syl Dawson, Paul Ziegelbein, Doug Rhodes, and myself. I was the youngest least seasoned of the four and felt honored to be picked. The meeting ended with a room full of "super charged" engineers - all eager to tackle their job assignments. At the risk of leaving out a name, I think it fitting to list the main design team members.

The Receiver, Exciter, and Transceiver

Sylvan Dawson – Project Engineer
 Bill Sabin – RF translators
 Joe Vanous – Exciter circuits
 Darrell Hennesy – Decade Synthesizer
 Gerry Erickson – Electrical Engineer
 Dave Church – Electrical Engineer
 Keith Wallace – Mechanical Engineer
 Steve Harmening – Lab Technician, Lead

The Remote Controls

Paul Zieglerbein – Project Engineer
 Keith Wallace – Mechanical Engineer
 Gerry Erickson – Electrical Engineer

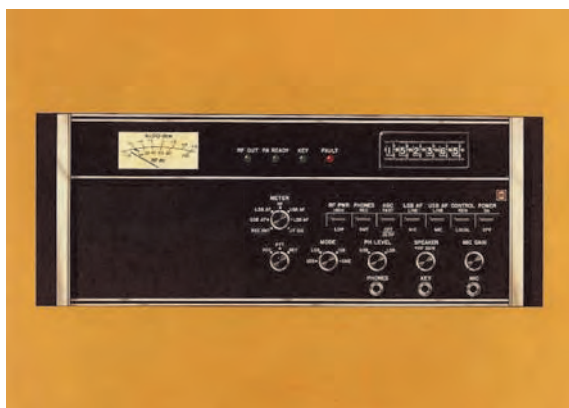
The 1kW Power Amplifier & Power Supply

Doug Rhodes – Project Engineer
 Wayne Kalinsky – Power Supply Design
 Don Herr – Driver Amplifier Design
 Don Fee – Mechanical Engineer
 Art Roderick – Mechanical Engineer, Servo Drives
 Bill Anderson – PA Lab Technician, Lead
 Tony Wilhelm – PS Lab Technician
 Gene Mick – Lead Draftsman

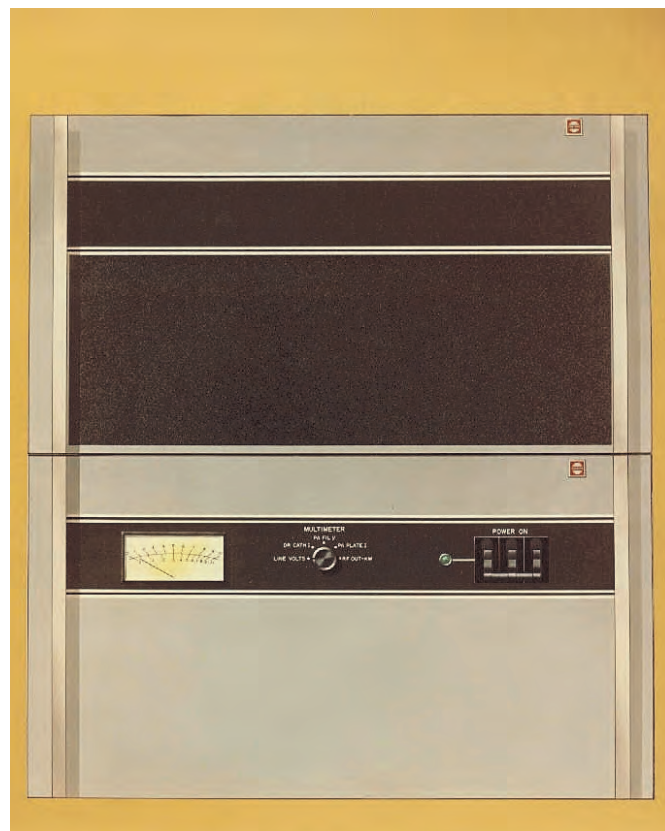
The 3kW and 10kW Power Amplifiers

Rod Blocksome – Project Engineer
 Ralph Jensen – Design Engineer
 Ray Beason – Mechanical Engineer
 Art Roderick – Mechanical Engineer, Servo Drives
 Duane "Gus" Gustafson – Lab Technician, Lead
 Bob Smiley – Lead Draftsman

The engineering plans also included artist renderings of what the new equipment should look like. The styling and control layout was carefully designed by our industrial designer and human factors expert Darryl Schultz. The renderings for the transceiver and 1kW PA & PS are shown below. You will notice that we had not yet decided to abandon the "Collins Gray". This would come later when all the equipment was to be painted with textured black epoxy paint



Original rendering for the First Receiver/Exciter



Original rendering of the 1 KW Tube PA in original colors

The design teams worked feverishly throughout 1975 and by early 1976 a few pre-production models were built and tested and we were ready to lift the veil of secrecy and introduce what was now called the "HF-80 Product Line". Dave Berner explained that this equipment was going to carry through the decade of the 1980's. I remember thinking that's a really long time....and still four years away.

Dave invited all the major Collins dealers and subsidiary marketing people to Cedar Rapids for a 4-day conference on HF-80. Each of us project engineers made detailed presentations on our equipment. I remember it as a grand time but we were still feeling the pressure to "iron out remaining bugs" and get the factory production running smoothly.

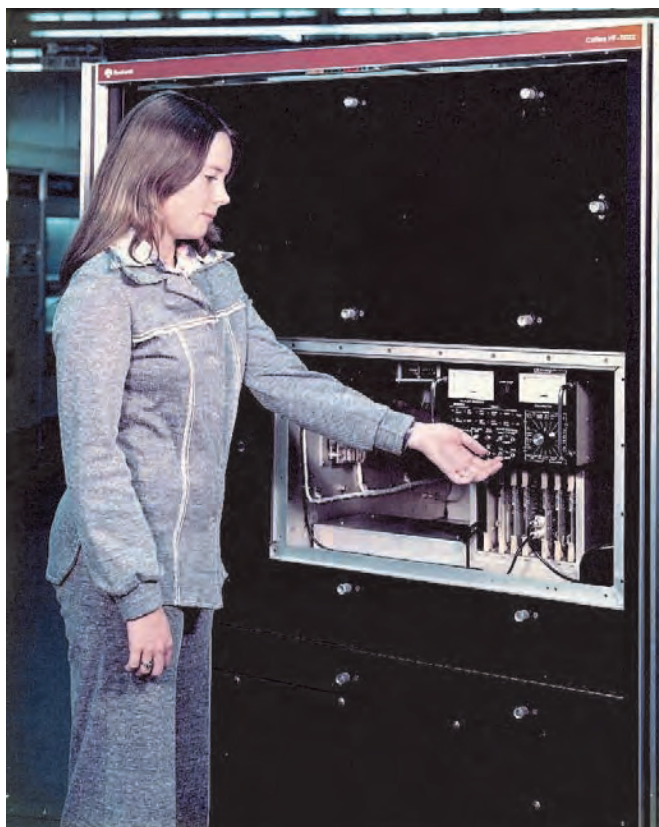


Dennis Day and the author (right) describing the new HF-80 Product Line to the Collins worldwide marketing team assembled at the Long Branch Convention Center in Cedar Rapids Feb. 9-12, 1976

When the first prototype equipments were completed, our part-time department intern, Nancy Anderson, then a high school senior, posed with the new equipment.



The prototype 1kW system above was shipped to England where it was publically introduced at "Comm '76" in Brighton, England - June 8-11, 1976



The original 10 KW PA Engineering Unit. This photo was taken to advertise the "built-in-test" and maintenance features of the new Power Amplifiers

At the same time the first advertisement (shown on the opposing page) appeared in the AFCEA magazine.

Dennis Day demonstrated the new HF equipment in England, and then shipped it to our subsidiary in Paris, France. The marketing plan was to continually move the demo equipment around the world on a demonstration tour conducted by a member of marketing and engineering. Dennis asked me to do the demos with Bob Hoke (HF marketing) in Paris, France, Rome, Italy, and Bern, Switzerland. In Switzerland, we were to hand it off to two fellows from our subsidiary in England who would take it through three more countries. I remember watching (and missing) the US bi-centennial fourth of July celebrations on French television that summer. But I thoroughly enjoyed the foreign travel, meeting customers and colleagues, and proudly showing off our newly designed HF-80 equipment. I learned a lot and returned home full of ideas for future improvements.

Later in 1977 I was the engineering component for HF-80 demonstrations in Australia, Malaysia, Singapore, Philippines, and Israel - all of whom later bought large HF-80 systems. This first hand contact with our HF customers was valuable experience for me as a design engineer.

Soon orders were coming in, factory production rates ramped upward, and deliveries were made. HF-80 became a huge success. More HF-80 equipment designs were thus funded to provide additional capabilities. The major additions and engineers were:

HF-8040 1kW Antenna Coupler - Glenn Snyder, Project Engineer
HF-8060 Pre/Post-Selector - Walt Roth, Project Engineer
HF-8014/8054 4-Channel ISB - Sylvan Dawson, Project Engineer
851S-1 Receiver - Paul Zieglerbein - Project Engineer
HF-8151A (AN/FRT-96) 10kW Transmitter- Rod Blocksme, Proj Eng

Ralph Jensen - Electrical Engineer
 "Gus" Gustavson - Lab Tech
 Steve Johnson - Lab Tech
 Ray Beason - Mechanical Engineer
 Art Roderick - Mechanical Engineer, Servo Drives

HF-8023 1kW SS PA & PS - Rod Blocksme, PA EE & Proj Eng



THF-8023 1kW PA & HF-8031 PS Design Team (L to R)

**Dennis Juve, PS Draftsman; Keith Wallace, PS ME
 Tony Wilhelm, PS Lab Tech; Wayne Kalinski, PS EE
 Rod Blocksme, PA EE & Proj. Eng.
 Vern Komenda, PA ME; Bill Andersen, PA Lab Tech
 Ken Wolleat, PA Draftsman (1978 Photo)**

Collins introduces the new HF-80 family.

The technology for the 1980s is here, at today's competitive prices. Collins' new HF-80: It's a family of Collins-quality, design-to-cost products for your communication needs of the '80s. These new products combine state-of-the-art technology, advanced packaging techniques, and the proven design advantages of our successful URG, 718U and 651S lines. The HF-80 family uses standard EIA racks for simpler and lower cost installation. Modular units are rack-mounted on slides for easy maintainability. High parts commonality lowers cost of ownership. And unit interfaces are simple; there's little need for systems engineering at the site. In the HF-80 series, you'll find a flexible answer to your communication challenges of the next decade. It can operate as a fully automated station; it also has stand-alone capabilities, remote or manual. Furthermore, it's CCR/ITU-compatible. Collins' new HF-80 family includes:

- Receivers and receiver systems • 1-, 3- and 10-kw transmitters and transmitter systems • 1-, 3- and 10-kw transceivers and transceiver systems, each capable of manual, FSK remote or computer remote control.

For assistance in evaluating your HF needs, or for more information on the HF-80 family, contact a Collins sales office in one of the cities listed. Or HF Marketing, Collins Radio Group, Rockwell International, Cedar Rapids, Iowa 52406, U.S.A. Telephone: 319-395-4014.

- Frankfurt (Weiskirchenstr. 10)
- Hong Kong • Johannesburg • Kuala Lumpur
- London • Melbourne (Lilydale) • Mexico City
- Paris (Rungis Principal) • Rio de Janeiro
- Rome • Tehran • Toronto

See the Collins HF-80 line at the Communication '76 Exhibition in Brighton, England, June 8-11, 1976.

Rockwell International

As before, I made many trips abroad with Bob Hoke demonstrating the new solid state HF-80 transmitter. In early 1983 we took two complete systems to Abu Dhabi, UAE. We installed one system in the customers' shabby, dusty, two room concrete building. It had a flat concrete roof which was ideal for a 35-ft whip antenna and the HF-8040 antenna coupler. In a few days we had everything installed and running perfectly and held several "show & tell" sessions with the UAE military. They wanted to keep the equipment for a "few weeks of operational trials". Bob and I went on to Egypt for another customer demo. Three months later they still had our demo equipment when we received a call "stating that our equipment had failed". There was a large order promised, so we quickly dispatched a senior field service engineer to Abu Dhabi. Upon arrival, it was obvious what caused the failure - the building roof over the equipment had collapsed and large chunks of concrete had hit the transmitter. The HF-8031 power supply took a heavy blow to the front panel breaking off most of the circuit breaker handles.

Remarkably, after cleaning up the mess and resetting the circuit breakers with a screwdriver, the equipment came alive and worked! The customer was impressed. I believe this near disaster was at least partially responsible for that order.

HF-80 Production History

Production of HF-80 equipment started in Cedar Rapids, Iowa in 1977. A very few units had come off the production line when a high level decision was made to transfer all HF-80 production to our facility in Toronto, Canada. This decision was driven by facility and labor utilization and not by direct cost analysis.

With this announcement came a collective "groan" from the design engineers as we had just gotten most of the inevitable production start-up problems solved and now we had to go through it all over again with different people in a different facility located an airline trip away.

But the start-up in the Toronto plant was accomplished and the production personnel became experts at assembling, testing, and selling the HF-80 equipment. Many innovative production techniques were introduced to hold costs in line. I remember many trips to the Toronto plant over the years and made many close friends in the process of solving technical problems.

During the mid-1980's HF-80 10kW transmitter production reached an unheard of rate of 1 per day. I remember seeing a delivery semi-truck at the dock unloading the 400 lb. HV transformers and creating a "sea" of these beasts covering the entire dock area. Nearby, the 10kW production line was running like an automobile assembly line. The 10kW PA's mounted on wheeled skids would roll down the line as each assembly operator would install his/her assigned parts. At the end of the line would emerge a completed PA to be taken over to a cage for final testing and a 48-hour "burn-in". It was a memorable sight I'll never forget.

One large HF-80 customer was the US Air Force who modernized their global HF Ground Station network with HF-80 10kW transmitters and receivers. It was always a source of personal satisfaction to visit one of their transmitter sites and see the long rows of the PA's I had designed years earlier. An example shown below is only a small portion of the HF-8022 10kW PA's installed at the USAF Davis, California site.

Another large HF-80 order came from the US Navy. They completed a procurement for 475 10kW transmitters. They had to be "transmitters" and not separate exciter and PA boxes. Plus, there were several other requirements not part of our standard HF-80 product line. This was a huge potential order and competition was stiff. The Navy procurement process included submitting your "candidate" equipment to be subjected to a series of tests in a formal Technical Evaluation. There were strict rules on how the Tech Eval was conducted. We quickly designed and built a prototype HF-8151 10kW transmitter and delivered it into the Tech Eval - while at the same



USAF Davis, California HF-8022 10kW PAs in service

time bidding and writing the proposal. Three other companies did the same: Harris, Marconi, and Continental. It was a very intense time.

Per the Tech Eval rules, if a company's product suffered a failure or failed a test, the company would be notified and had 72 hours to respond and fix it. I remember getting such a call during our 4-day holiday for Independence Day. I caught the first plane out to Norfolk, Virginia and in the course of trouble-shooting our problem found a resistor out of tolerance. I went to Radio Shack, bought the proper resistor, and had the transmitter going again the next day. We went on to eventually win the contract with very few people knowing our Tech Eval radio contained a Radio Shack resistor.

The next technical hurdle after winning the Navy contract, was to successfully pass an Operational Evaluation. This would clear the way for "full rate production" of 475 transmitters. Op Eval was to be conducted with eight production transmitters to be installed at the Navy site near Morón de la Frontera, Spain. The Navy procurement folks were just as keen to expeditiously pass this test as we were. Op Eval covers all aspects of introducing a new system into the Navy: Technical performance, Logistics, Maintenance, Operations, Training, Instruction Books, etc. I spent several weeks in Spain preparing for Op Eval. The first task was to check and certify that all eight transmitters were properly installed and operating up to spec. Second was to provide on-site training to the Navy operators and maintenance personnel as their performance with the new equipment was critical.

Training the operators went smoothly as it was easy to learn and not very complicated. However the maintenance folks were a different story. The first day I gave them an 8-hour lecture on the theory behind every circuit in the transmitter. It was a boring, hard-to-stay-awake session for the young troops. That night I decided to try something different. The following morning I announced we were going to divide the class into two teams. They could go have a coffee break while I would introduce a fault into two of the transmitters. Each team got a transmitter and I would measure how long each took to: a) identify the fault and b) repair the fault and then demonstrate the transmitter operating correctly. We would do this exercise repeatedly with progressively more difficult faults. I would keep score and award a prize to the winning team at the end. This got their attention in a big way.

However, the Navy procurement engineers from Norfolk expressed concern that they might damage a transmitter, requiring parts to be shipped in from Cedar Rapids, and thus delay the start of Op Eval. I

was worried about this possibility as well, but thought the benefits outweighed the risk. Over the next week the competition was a success - even spurring several trainees to take the books home at night to study. At the end while driving back to the hotel outside Seville, the Navy engineer constructed a home-made award. That night at dinner he presented me with the "Seat of your Pants Engineering Award". It is one of my most prized mementos from this time period.

Three months later we were notified that we had passed Op Eval - something that rarely happens on the first attempt.

During the 1980's limited HF-80 production took place in two other locations - Melbourne, Australia and Belgrade, Yugoslavia. We landed a large contract with the Australian government that included a requirement for in-country content. Our subsidiary in Melbourne geared up to assemble the HF-8022 10kW transmitters using components purchased from our qualified vendors and shipped from the US

to Australia. But shipping the heavy transformers was going to cost as much, or more, than the transformer. The solution was to qualify new transformer vendors in Australia - which we did after a couple trips to Australia.

Yugoslavia was keen to buy and produce a large quantity of HF-80 equipment and, after a long series of trips back and forth and tedious negotiations, contracts were finally signed. I remember a celebration dinner at the Cedar Rapids Country Club with our marketing hosting five customers from Belgrade. Prior to dinner, our marketing manager, with much fanfare, produced a bottle of Yugoslavian liquor and expounded on his difficulties in finding this special liquor in Iowa. A toast was made with everyone standing in a circle. It reminded me of paint thinner. The Yugoslavian engineer standing next to me whispered "Don't tell anyone, but in Yugoslavia this is a special drink used only at wedding ceremonies" Of course, afterwards I did tell, and we had a big laugh.

The Yugoslavian HF-80 program initially involved the outright sale of HF-80 equipment followed by a gradual ramping up of a licensed production facility named Pionir and located just outside Belgrade. This process was drawn out over a period of several years.

By 1990 the world was changing. The Berlin Wall came down and the Cold War ended. Orders for HF-80 equipment declined and the decision was made to close the Toronto plant and sell the land and buildings. It was a sad time - particularly for the dedicated personnel in the plant. In the next couple years there were occasional attempts to revive HF-80 production back in Cedar Rapids but all fizzled for various reasons.

Looking back over this 15 year reign of HF-80, I'm amazed at the amount of worldwide sales and the variety of systems produced. The HF-80 success was due, first of all, to the experienced and skilled leadership at Collins and to the dedicated design and development teams backed by the skilled Collins support functions. I was fortunate and privileged to have been a part of it all.

de Rod Blocksme, K0DAS

Editors Note: Rod is retired from Rockwell Collins and is also the past curator of the Rockwell Collins Museum in Cedar Rapids. He writes for the *Signal Magazine* often and is passionate about preserving the history of his company, its people and its equipment.

HF-80 From Concept to Market

by Dave Berner, Retired Rockwell Collins

When I was asked to share how the HF-80 Product Line was conceived, I had to reflect not only on the Collins business environment, but also on my work experiences leading up to the HF-80 "hatching". Upon graduation with a BSEE I had been offered a position with Collins in 1962. Early assignments were developing technical manuals for a new HF Product Line called Universal Radio Group. It wasn't long after that I was then assigned to develop detailed test procedures for the Apollo HF Transceiver. Wow! What a privilege. Following that assignment, I was transferred to the Surface Communications Product Line organization. Here I became involved with developing customer proposals, marketing literature, and customer marketing support.

During this period the Univ. of Iowa was offering night extension MBA courses in Cedar Rapids. I was accepted into the program and began with studies in finance and marketing. This track was interrupted when I was transferred to Texas but provided valuable insight that became helpful as time passed.

As part of the company's growth, in 1967 management moved our product management group to the Richardson, Texas facility along with product systems production. This was about the same time that the company started marketing C-System HF (URG II) and our group was assigned management responsibility for the newly developed URG II product line. Development and production of the functional "slices" was disbursed between Cedar Rapids, Iowa and Richardson, Texas.

In the fall of 1970, several in our group were asked to transfer back to Cedar Rapids along with the Surface Communications Product Line responsibilities. This was in the midst of the decline in business and lack of profitability. My direct responsibilities related to URG I and URG II as Product Line Manager.

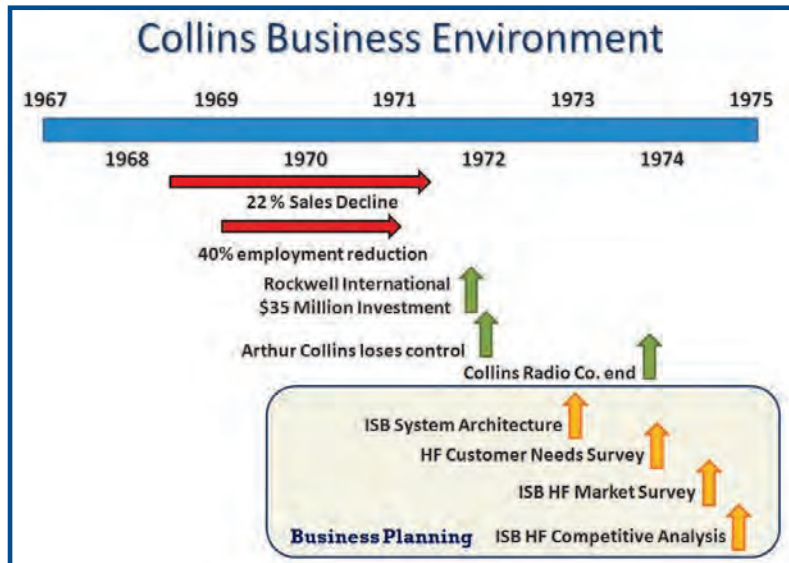
That being said, the environment in which we were operating in the late 1960's and early 1970's would influence future business success or failure. This environment set the stage for the future of the company across all of its businesses. Success would be determined by how the environment would be recognized and how we would react in the new culture to yield profitable competitive success.

Collins Business Environment Transition

All product development activity during the late 1960's and early 1970's was influenced by the direction of Arthur Collins and his C-System vision. In his book *Arthur Collins Radio Wizard*, Ben Stearns captured recollections of Bob Cattoi (Head of engineering management and development of computer projects). Art said: 'Let's start with what we are really trying to do --- that's to manage information. To manage it we have to compute it, control it and make some decisions. We have to have more than just a computer, more than just communication --- we have to look at the way information is formatted, the way we use communication and computers.' He talked about the importance of the data base. He talked about what he called data architecture, overlaid on control architecture, overlaid on communications architecture. It was this forward thinking concept that became known as the Collins C-System. This broad vision would require thousands of engineering development hours and related infrastructure costs. As development progressed over many years, research and development resources from ongoing business was insufficient to underwrite the ongoing C-System development. Declines in profit from ongoing core businesses followed significant declines in orders and sales due to market shrinkage (recession) and competitive encroachment in traditional markets. Communications equipment demands for the Vietnam conflict and the manned space program were good business contributors but were not sustainable. Commercial avionics businesses tied to cyclical airframe market demands and

emerging competition were also a factor impacting bottom line cash flow. External bank financing was not enough to sustain the C-System appetite for development funds. In addition, funds for development of existing product improvements and/or replacement dried up.

After employment reductions of 40 percent during fiscal 1969 through 1971 and exploration of outside financing, on August 31, 1971, Collins shareholders approved revised Articles of Incorporation. The revisions



included increasing the size of the Board of Directors from 12 to 13 members and issuing new convertible stock. On September 2, 1971, North American Rockwell made an investment of \$35 million in Collins in return for newly issued stock, and elected seven members to the board. Arthur Collins remained president and CEO until November 23, 1971 when he was asked to relinquish his position and offered a technical advisory position. Robert C. Wilson was named as president and CEO and began the changes to Collins' business model. On November 2, 1973, Collins Radio became part of Rockwell International in a merger that raised another round of cash.

As one reflects back today, some forty years later, Arthur's visions were futuristic and ahead of the technology it would take to cost effectively implement the concepts. As he foresaw, the use of digital communications, computation, and control technologies continue to expand and impact mankind.

Electronic Technology Advances

During the period of Collins Financial turmoil in the early 1970's, there were several significant technology advances external to the company that would prove to have an impact on Collins business and in particular Collins HF communications business.

The development, launch and network integration of geostationary satellites brought the reality of near instantaneous long haul communications. This giant shift in communication strategy was related to a number of underlying advancements.

- The development of large scale integrated circuits and related manufacturing processes
- The development of integrated computer control of HF Systems
- The development of the first microprocessor
- The development of higher power rf semiconductors
- The development of multilayer printed circuit boards and related manufacturing processes

Expansion of Collins HF Core Competency

From his boyhood interest in radio, followed by building a company initially producing high-frequency radio equipment, Arthur Collins established a reputation for superior performance, high quality, and reliable communications equipment. Expansion into aviation equipment followed a natural progression of utilization of the rf spectrum to serve mankind. Over the years the company's offerings covered not only the amateur radio market but also aviation, telecommunications, and commercial broadcast for domestic and international customers. The following paragraphs focus on a segment of the overall business that addresses high-frequency communications for primarily fixed station and transportable application. It sets the stage for the conceptualization, planning, and development for what has become known as the HF-80 Product Line.

Collins HF Fixed and Transportable Systems Equipment

Universal Radio Group HF Products --- URG-I

Ongoing orders and sales of URG I equipment and systems since their introduction in 1962 were generally split between international (40%) and US Government (60%) customers. Peak order volumes achieved in 1967 declined by the early 1970's. This was partly due to reductions in US Government spending following the Vietnam Conflict and price pressures resulting from the availability of more current competitive technologies. By the early '70s, there were more than 15 domestic and international producers of various kinds of HF communications equipment.

C-System Design Driven HF Products --- URG-II

A small part of the overall conceptual C-System architecture and development effort included a new family of HF equipment. *Computer control interface* was a dominant technical feature along with high performance Mil-Std 1553 Link 11 data compatibility characteristics. The C-System Products mechanical packaging (at that time) retained the Aeronautical Radio ATR packaging concept with next generation multilayer circuit boards interconnected with multilayer back planes.

In an April 1, 1967 memo to "All Marketing Personnel" John Boyle, marketing vice-president, stated...

A basic feature of Collins' new CCCS oriented HF product line is the multiple use of various slices in all HF application, including surface, aviation, marine, etc. Traditionally we have operated largely on the basis of specific product to specific applications. This was practical and desirable in the past, as black boxes were generally designed to meet specific application requirements. We are now in an enviable position of having considerable flexibility to meeting various applications by use of common slices.

URG II high speed data performance for the state-of-the-art was excellent and product slice configurations were initially accepted by the US Air Force. Orders during the first five years prior to 1973 were 95 % US Government on a handful of programs. These products generally served the high end market (technical performance & packaging design) and there was price limited international market penetration and related total business volume.

HF Fixed and Transportable Market Environment

US Government HF Equipment and Systems

As the United States ramped up its military involvement in the Vietnam War in the early 1960's, several major HF communications programs were initiated by various branches of the US military. During

this same period of time, the United States was also involved in the "race to the moon" Both of these major US Government expenditures provided a strong technology business base in the country and at Collins Radio.

One might ask what role HF communications played in Apollo missions. On somewhat a parallel track, the run up to the moon landing was also the development of satellite communications. During this time, HF systems (URG I) were installed at tracking stations around the globe. An HF suite of equipment (URG I) was installed aboard the Apollo Range Instrumented Aircraft. The Apollo Ships (naval tacking and recovery fleet) had an HF suite (URG I) aboard. And, the Apollo Command Module also had a fixed frequency transceiver on board for recovery operations.

International HF Equipment and Systems

HF communications was still the mainstay for long haul communications circuits for aviation, shipboard, and telephone circuits. Traditional customers besides international military organizations included post and telegraph services as well as industrial applications. Addressing this market were several European HF manufacturers as well as US.

Collins HF Competitive Positioning

In the beginning, Collins Radio technology was rooted in high-frequency Amateur Radio by 9CXX, young Arthur Collins. Equipment produced by the company became the equipment of choice by professional and amateur operators alike. Arthur also had an intense interest in aviation and saw the need for aviation related communication and electronics. His amateur radio hobby and aviation interest were key drivers in the development of Collins Radio business from incorporation in 1933 forward.

In the '40s, aviation electronics began to be packaged in a series of standard "black boxes". The new standard that evolved defined maximum height and increments of depth and width to accommodate the particular electronics contained. This packaging and racking standard was referred to as ATR.

By the mid-1950's, Collins had established itself as a technologically superior, high quality and reliable manufacturer of aviation electronics. The company was a dominant supplier of avionics for commercial and government transport aircraft. This included communications, navigation and flight control products and systems. In parallel, amateur, fixed station, transportable and shipboard board H-F equipment markets continued to grow with advances in Collins products.

During the early 1960's, Collins developed an HF family of ATR packaged I-F and R-F Translators, pre-selectors, 1 KW power amplifier, power supply, and FSK controls. This family was called, Universal Radio Group. It provided coverage of the 2.0 to 30.0 MHz frequency spectrum.

The packaging was ideal for large aircraft installations. For ground applications, a system of shelving, cooling air, electrical interconnects of the selected ATR boxes had to be constructed. A series of standard shelving and racking products was developed in the mid 1960's to minimize unique systems integration expense.

In the 1950's, two engineers left Collins Radio to join General Dynamics and subsequently became acquainted with Bill Stolze. Bill had worked for RCA, Stromberg Carlson, and P.R. Mallory Co. in various engineering positions. The three of them decided to start a new radio communications company in Rochester, NY. Bill's stated philosophy was..."There is a place in the world for a company specializing in radio



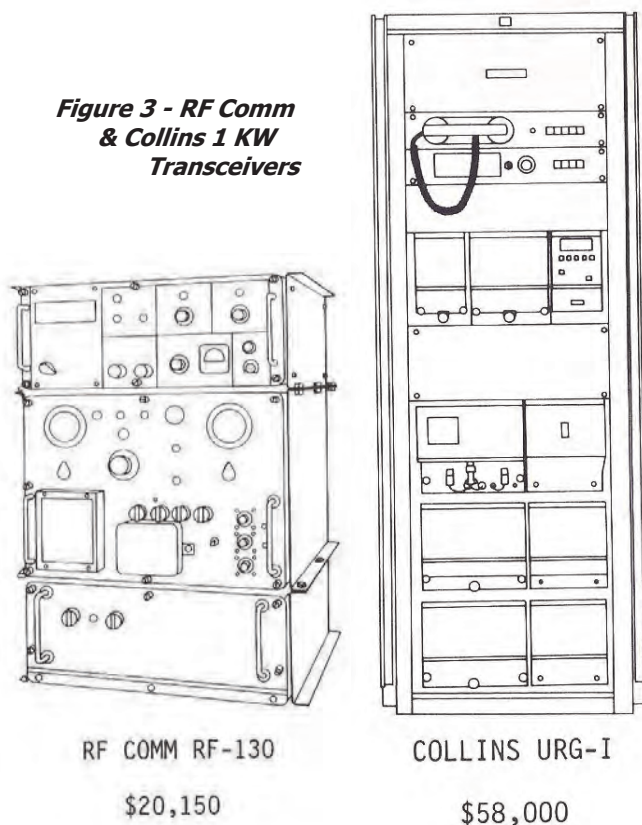
Figure 2 - URG I HF Product Line System

communications." In 1961, RF Communications, Inc. was established. By 1969, when Harris Corp. acquired RF Comm, their sales had reached \$26 million with a mix of US Government and international business. When Collins marketing representatives were asked who their primary competition for HF ground and maritime products was the answer was more often than not, RF Comm.

URG I versus RF Comm

Since the RF Communications company was a start-up by two former Collins engineers, one can assume that the insights into Collins technologies and strategies were competitively useful to them. During the late 60s, a period of that corresponded with the financial turmoil at Collins, RF Comm had established itself in the Fixed Station and Transportable HF market segments. There was a wide spread between RF Comm (much less expensive) and Collins in prices offered for comparable performance 1 KW Transceivers. It didn't take a rocket scientist to make a purchase decision given that either offering would meet their performance requirements. The accompanying figures illustrates the 1 KW physical and cost comparisons. The Collins 10 KW Transceiver was also priced at 26% higher than the comparable RF Comm offering.

**Figure 3 - RF Comm
& Collins 1 KW
Transceivers**



Although there were other domestic and international producers of HF equipment addressing various niche markets at the time, we chose RF Comm as the "team to beat".

URG II High Performance HF

Given that URG II addressed more sophisticated performance applications and its cost was appreciably more than comparable URG I offerings, there was little fit for URG II in the higher unit volume HF market segments of the day. Thus, URG II was not a competitive player in the Collins versus RF Comm arena.

Collins Business Transition --- Enter Rockwell

Business Restructuring

When Robert Wilson began work as President and CEO, the company was organized functionally with principally a top down management structure. A major reorganization took place in 1972. The functional

organization was broken apart into a decentralized structure made up of a number of profit- and loss-responsible, market-oriented divisions. The new organization enabled personnel throughout the Company to initiate and carry out appropriate actions.

Shifting Business Operations Discipline

The designated business profit centers were directed to develop strategic plans with particular emphasis on technology leadership. Operating financial goals were set and progress was reviewed monthly. Quality standards were to be maintained, and added emphasis was given to customer service. The initial \$35 million North American Rockwell investment was put to immediate use to help stem the flow of red ink.

Limited Discretionary Development Funding

In the years prior to Rockwell, discretionary R&D funding was directed primarily to C-System related engineering projects guided by Arthur Collins. Due to the financial turmoil in the early 1970's, discretionary R&D funds were significantly limited to a few market related project commitments. Business strategies embraced customer sponsored development programs which were primarily related to US Government programs. Very little funds were directed towards in house engineering "ideas". However, as overall operating revenue improved more discretionary funds became available.

Something Must Be Done --- URG Business Decisions

The URG I ATR packaging and design concept enabled functional configuration of modules within the black boxes as well as flexible combination of boxes. This feature allowed custom adaptation of the various modules and units to customer requirements. However, production inventory planning and throughput was administratively complex, costly, and hurt customer "order to delivery" cycle times. To simplify administration, reduce costs, and improve delivery times, standardized configurations were defined and placed into production. This was known internally as the Standard URG (SURG) project.

URG I products were already in production when I was appointed the Product Line Manager in July of 1967. Responsibility for the URG II Product Line was added in July of 1969. The previous paragraphs have outlined the environment the company was operating during this period, as well as the management changes that then took place in 1972. Management restructuring into market/business focused profit centers provided an opportunity for strategic thinking and an environment for market driven business planning. In addition to day to day business activity, we had the opportunity to address the future and look for ways to profitably grow the business.

Having been involved in many competitive procurement activities in both domestic and international markets, I had experienced winning - and losing! - contracts for URG equipment and systems. Something needed to be done to improve our competitive position and expand our addressed market especially where potential market growth was indicated. Independently, I developed architecture for a new product line that would replace URG I. The new Product Line would include a new family of Receivers, Exciters, Transceivers, 1 KW Linear Amplifiers, and value engineered 3 KW and 10 KW Linear Amplifiers. The concept was laid out on a single 36" x 33" piece of Clearprint paper dated 1/23/73.

International customers were procuring this type of equipment as off the shelf catalog items from competition. RF Comm also had their equipment listed on the GSA catalog for "off the shelf" delivery. Given that this was a time of discretionary austerity and that there was no single outside customer program to provide development funds, it looked like it would be an uphill battle to obtain internal funding to move forward.

In March, 1973, Collins marketing & international dealers were surveyed relative to the need for a 1 KW Power Amplifier. The data was returned and compiled in August, 1973. In a sense, it raised more questions than it answered. What did the customer really need for long haul comm? The power amplifier was just a piece of the puzzle.

In May of 1973 I transferred to HF Engineering in the staff role of HF Applications Engineer. This included department planning activities in support of the department manager, Dennis Day. My horizon was widened to include all HF related markets and business. Meanwhile URG Product Line business was not getting any better. In October, 1973 I led the development of a Customer Needs Survey for HF SSB Equipment. The survey format addressed Market Potential Evaluation, Competitive Evaluation, Product Definition, and a price-demand analysis. Inputs were compiled by December, 1973. The conclusions were...

- The lower cost HF Market was real - especially internationally
- Complete package subsystems were desirable
- Separate receivers and transmitters were required
- Independent Sideband (ISB) operation was required
- A simple remote control was required

Based on the survey inputs and incorporating the conceptual architecture (adjusting where necessary), Company Private Product Definitions were developed for what was to become the ISB (Independent Sideband) Product Line. In March, 1974, this information was shared on a confidential basis with relevant marketing personnel. The market potential and competitive evaluation data was once again sought on the basis of the specific Product Definitions.... Were we on the right

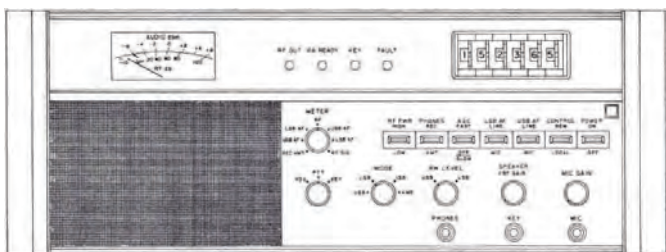


Figure 4 - ISB Receiver/Exciter Concept Rendering

track for success? Data was returned and compiled in July of 1974. Meanwhile, overall, the business climate was significantly improving. Rockwell International (North American Rockwell renamed in early 1973) now included the "Radio Company" and just maybe we could obtain some "Company" sponsored research and development funds. However, we needed a comprehensive Business Plan. In May, 1974 I was appointed to the position of HF Futures Planning within the HF Engineering Department. This enabled me to focus more effort on the ISB Project. By September, 1974 the process of developing a business plan for ISB HF was initiated. The overall Business Plan included related plans for Marketing, Product Design, Manufacturing, Product Support, and Finance. I had the task of coordinating the effort and pulling together and organizing (and documenting) the final Business Plan. This effort was completed on April 15, 1975.

The ISB Business Plan

It had been a little over 27 months since I had laid out the initial concept for the URG I replacement product line. As noted previously, this was a time of significant change for Collins Radio. Company sponsored development related to the C-System drained financial resources. US Government business declined following the Vietnam War and NASA's development of the Apollo program. Competitive positions of existing products were marginalized. All of these factors minimized the availability of company sponsored development funds for existing product improvements. Thousands of employees were laid off and there was a period where employee salaries were cut across the board.

In addition to the \$35,000,000 infusion of capital funds, Rockwell brought business discipline to the forefront of operations and management structure. Internal business related training, facilitated by outside resources, was put in place. These were the years of bottoming out and turn around in the business fortunes of the company. We

were hopeful.

The surveys completed by front line marketing and dealer personnel, coupled with available market data, provided a basis for the business plan. The market was real especially in the international community. This would be our primary focus. The following excerpts from the Business Plan provided the direction.

Key Objective

Profitably regain market share lost to competition, increase the addressed market, and reestablish Collins as the leading supplier in the fixed station/transportable HF ISB international market within five years.

Success Strategies - We would:

- * Offer only those products that can win in the competitive market place by optimizing cost-effective design
- * Develop a business plan which allows operational flexibility to achieve the business objective within the competitive arena
- * Establish a leadership position in cost effectiveness, technology, marketing effectiveness, and product support
- * Minimize cost and conserve cash by drawing on existing company resources
- * Establish a commercial position through the international marketplace
- * Obtain supplemental customer development funding for product line enhancements
- * Obtain additional competitive leverage by employing multi-national production
- * Establish effective program management procedures

Competitive Design Strategies

- * Technical performance to be compatible with ITU/CCIR international recommendations
- * EIA standard 19-inch rack mounting
- * "Works-in-a-drawer" modular serviceability
- * Built-in audio and control elements
- * Unique sensory features
- * Plug-in control options for local, remote and computer control

Low-Cost Design Strategies

- * Utilize best applicable features of existing designs
- * Minimal design to achieve necessary technical performance using commercial parts
- * Employ design-to-cost and value engineering techniques
- * Maximize commonality of parts and modules

Marketing Strategies

- * Establish a dedicated marketing team to effectively introduce the product line
- * Initial sales emphasis on international marketplace to establish a commercial position.
- * Continually monitor and update marketing plan to reflect market trends.
- * Develop comprehensive sales and advertising tools.
- * Conduct an in-depth international sales seminar to ensure maximum enthusiasm and familiarity prior to introduction.
- * Encourage live equipment demonstrations and evaluations with key customers.
- * Produce ISB hardware on a planned speculative release basis to provide competitive availability.

Product Support Strategies

- * Equipment maintenance concept to be established concurrent with each unit design.
- * Commercial maintenance manuals prepared for "on-site" modular replacement and service center part replacement.
- * Training programs including video instruction will be produced.
- * Standard test equipment will be emphasized. Special test equipment would be minimized.
- * Computer program to provide customized recommendations for customer spares.
- * In place international service centers will be enlisted to support products.
- * A full time ISB Trained field service engineer will be engaged.

ISB Equipment will be warranted for one year.

Financial Objectives

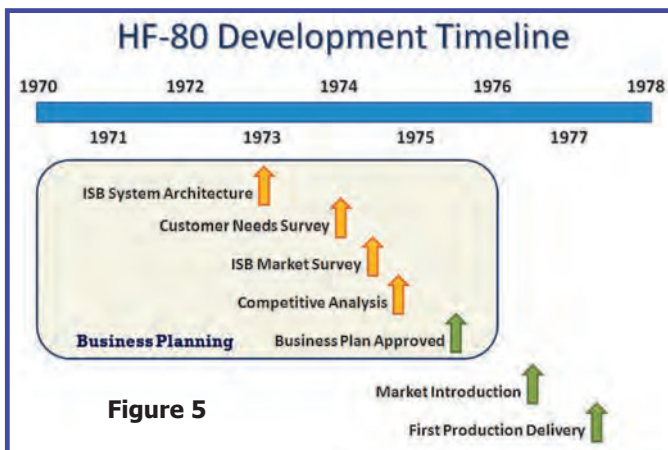
The financial plan called for an upfront company cash commitment of \$800 thousand during fiscal years 1975 and 1976. Projected orders for the five year period following market introduction were forecasted as \$ 53 million. Anticipated profit before taxes was greater than 25%. Among other things, this would be dependent on achieving a competitive commercial pricing position in the marketplace.

Management Presentation of Business Plan

A management presentation was assembled, and scheduled. Yours truly was given the opportunity to stand up and pitch the plan on behalf of the HF Product Business Area. Overall, I felt good about the presentation and was able to answer questions. Support of the HF Business Area personnel present was positive. A senior marketing manager stated that he was of the opinion, that in view of the emerging satellite communications technology, HF was dead. Is this really a good investment? Discussion ensued.

Management Approval is Granted

The ISB Business Plan was completed on April 15, 1975 and signed off by Gary Jost, HF Programs Manager the following day. Subsequent requests for engineering expenditures were submitted to company management. Following review and 16 signatures later, including the Rockwell Group President Don Beall, the approval memo was received by the team. ***We were good to go.***



ISB (HF-80) Product Development

It was twenty-seven months from initial inception to business plan approval. A deliberate process of internal education and external research and surveys (slowed somewhat by lack of resources during periods of company financial stress) finally resulted in an actionable plan. The challenge now before the development team was to convert paper and thoughts to hardware in 12 months. Market introduction was scheduled to coincide with a major international trade show scheduled for June, 1976. Figure 5 shows the total timeline.

Development Team

Key players assigned to the development team were also involved in the formulation of the business plan. A broad base of experience in HF equipment and system design and production was available in those selected. In addition, there were several other personnel from various disciplines involved on an *as needed* basis throughout the development, testing, and production integration phases. In addition to myself as the Program Development Leader, the initial team consisted of the following assignments: Receiver/Exciter Project Engineer: Syl Dawson, Remote Controls Project Engineer: Paul Ziegelbein, 1 KW Power Amplifier Project Engineer: Doug Rodes, 3 and 10 KW Power Amplifiers Project Engineer: Rod Blocksome, Overall Mechanical Engineering Lead: Chuck Gregory

Commonality, Commonality, Commonality

The culture of the Collins Radio Co. prior to the Rockwell investment, was that of advancing the communications technology state-of-the-

art. High quality design practices to achieve reliable performance in environmental extremes were the norm. Cost of the hardware was often overlooked in favor of these practices and objectives. The advent of the Rockwell investment provided an opportunity and impetus to shift the culture to a more balance approach to planning & design. Competitive cost effectiveness with competitive technology became the turnaround mantra.

One of the key design strategies emphasized for the ISB program was that of commonality. Commonality of commercial components, throughout the product line, would maximize composite production purchase quantities and reduce costs. Commonality of modules across the individual products within the product line to minimize production costs. Commonality of mechanical parts across the product line was also sought. This would also include considering placing added holes in chassis castings and fabricated panels if they could be used in several places without hampering design integrity. This would reduce production set-up costs and amortize those set-up costs over a much larger production quantity. This approach to the design was also reinforced by challenging "design-to-cost" targets.

HF-80 Is Born

During the planning and development process the new competitive product line carried the internal identification of the ISB Program. The market product nomenclature was planned to complement an overall marketing campaign. Traditionally, new Collins products were given the "next in line" type number nomenclature for respective equipment types. The "keeper of the type numbers" released the type numbers to the product designer and maintained the records for the company.

The marketing strategy for product identification for the ISB Program was to provide a means to achieve the following....

- Market recognition of a family of products
(EG. URG, S-Line, Micro-Line, etc.)
- Brand image identification with function
(EG. Elmer's Glue, Scotch Tape, etc.)
- Provide a purchase motivation facet
(EG. Satisfies current and future needs.)
- Establish relationship with Collins quality
(New generation of proven products.)
- Provide for functional identification
(XYZ where X=function, Y=model, and Z=option)
- Individual product identity with the product line

The underlying theme of the program resulted in **a family of HF products incorporating technology for the 1980's, available in the 1970's, at prices of the 1960's..... HF-80.**



Figure 6 – Early HF-80 System Components Including the HF-8020 1 KW PA and 8030 P.S. And the HF-8070 Receiver/Exciter (Left)

HF-80 Product Family

The HF-80 product family included a receiver, a receiver/exciter, exciter, 1,000 watt power amplifier, 3,000 watt power amplifier, 10,000 watt power amplifier and system remote control units. Equipment type number identification was assigned as follows:

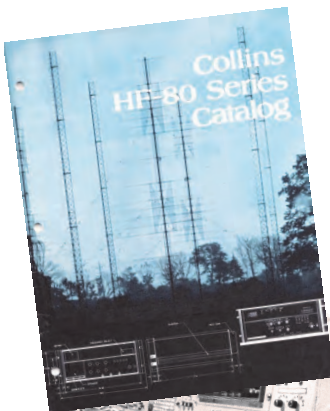
HF-8010 Exciter	HF-8090 Xmtr	Remote Control
HF-8050 Rcvr	HF-8091 Rcvr	Remote Control
HF-8070 Rcvr/Exciter	HF-8092 Xcvr	Remote Control
HF-8020 1 KW P. A.	HF-8030 P. A.	Power Supply
HF-8021 3 KW P. A.		
HF-8022 10 KW P. A.		

HF-80 Market Introduction

Bringing Marketing Up To Speed: Prior to its formal market introduction, Collins international marketing staff and dealer organizations were invited to Cedar Rapids for a comprehensive seminar on February 9-12, 1976. Overview marketing presentations and in depth technical presentations were made by the development program team. It was once again an opportunity for input to the development team as



Figure 7— The HF-80 Marketing Introduction meeting held at the Long Branch in Cedar Rapids February of 1976



well as responding to questions from front line field personnel.

HF-80 Advertising for trade periodicals, press releases, marketing literature, and slide presentations were produced



Figure 8 – Trade Show Exhibit Desk

to support the marketing visits and demonstrations.

Two major electronics trade shows were scheduled for the spring of 1976. The key International show was Comm 76 taking place in Brighton UK during June 8 – 11, 1976. Marketing meetings would precede the opening of the public event. An HF-80 system would be unveiled and demonstrated.

Collins traditionally exhibited at the annual Armed Forces Communications and Electronics Association (AFCEA) held in Washington, D.C. The 1976 show was also scheduled for June, 1976. An engineering model live demonstration HF-80 1 KW Station was set up in a private hotel room. Select customer personnel were invited to the private



Figure 9 - Promotion Photo—Office Environment

showing away from the eyes and ears of competitors.

Following Comm 76, Rockwell/Collins marketing and engineering staff started an extensive tour of a number of international markets and customer locations in order to effectively introduce the new HF-80 Product Line and look for near term and future business opportunities.

A complete set of demonstration equipment was shipped overseas and then the engineering and marketing crews would rotate in and out of overseas assignments manning the demonstrations. The Rockwell/Collins International sales offices provided customer contacts, scheduling, and follow up visits.

Production Transition

Following the introduction of HF-80, marketing set about filling their order books and worked with potential customers while engineering, manufacturing, and product support moved toward production. An engineering test bed was established with on-the-air testing on a 24 hour per day schedule. This proof of performance testing was de-

Continued on p 48

Why did these 50 airlines order Collins Flight Directors?



ACTUAL SIZE

Because Collins' three-dimensional Flight Directors (the FD-109 is shown here) give aviation its most advanced approach to all-weather landings. A natural, human-engineered V-bar indicator presents positive steering commands from takeoff to touchdown. The system provides a con-

stant visual picture of aircraft attitude and position. The 3-D concept eliminates parallax.

Proven in service around the world, the FD-108 and FD-109 are the latest in a long line of Collins flight director systems. Both are certified for Category II operations.



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Bangkok • Beirut • Frankfurt • Hong Kong • Kuala Lumpur • Los Angeles • London • Melbourne • Mexico City • New York • Paris • Rome • Washington • Wellington

Best equipped for any flight level.



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*Synthetic vision on
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Largest high-resolution LCD

MultiScan™ Threat Detection

Scalable to any business jet

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**Rockwell
Collins**

Building trust every day

signed to look for potential operational anomalies and initiate corrective action before full production. Manufacturing set up their assembly and test procedures and instructions. Parts were placed on order. Product support implemented their strategies towards enabling customer friendly support resources. Production assembly and test personnel were put in place and trained. Result: Production began - and



**Figure 10 -
Dennis Day,
Group Manager
stands proudly
in front of the
display of
HF-80 gear at
Comm 76 in
Brighton,
England**

the first HF-80 equipment was delivered - in the spring of 1977.

HF-80 Program Management Transition

In August, 1976 the HF Products Director, Gary Jost, requested that I would take on a new assignment. That assignment is worthy of, and is in this issue, another whole story. However, the business planning approach used with the HF-80 program provided a valuable experience base for this challenge ahead. The company environment had changed to a profit/market driven business model which had resulted in an entirely new Product Planning methodology. My new challenge was to lead a team to explore the feasibility of pursuing lower cost HF equipment market niches. Anticipated outputs of this effort were business plans that addressed fixed channel transceivers, Amateur HF Radio transceivers, and general purpose HF receivers.

Mr. Ed Rathgeber was designated the replacement HF-80 Product Line Manager to carry the ball forward and manage the next stages of the product life cycle. This is a continuing story.

----- CCA -----

Epilogue

Although my primary attention was thereafter directed toward other opportunities, I couldn't help but have a latent interest on how HF-80 business ultimately played out as the years progressed. The key question was "how did we do compared to the plan?" In Summary: A commercial position was achieved and recognized by the U.S. Government. Product line extensions were developed to address expanded niche markets. Cumulative orders by 1990 were more than \$ 234 M exclusive of international licensing. (Remember, the original goal was \$53M) Gross profit margins were a significant contributor to the division's operating profit over the HF-80 product life. Economic benefits were provided for Rockwell Stockholders, company employees, and the local businesses. As I look back, I am impressed with and appreciative of the team effort that was put forth to make HF-80 a success.

Editor's Note: It is also significant that the HF-80 program was probably the first in house funded program to be planned and developed under the new "Wilson/Rockwell" culture. It can only be described as wildly successful. We are indeed fortunate to get the insight of the man that planned it. This insight not only reads on the HF-80 project but also gives us a real feel for some of the changes which hit Collins Radio when they were merged into Rockwell.

Attached here is also a summary of production volumes that were provided by Rod Blocksome, who - some years latter - summarized the results of this significant program in a report that now resides in

the Rockwell Collins Museum.

This report was done in 1995 after the conclusion of the program.

Extract courtesy of Rod Blocksome:

1kW Tube Transmitters (PA, PS, Exciter or R/T) = 1,500
1kW Solid State Transmitters = 800
3kW Transmitters = 95
10kW Transmitters = 1500 (includes 475 FRT-96 + 10 HF-8151A)
Receivers = 4000 (includes the 851S-1)

The Rockwell Effect -

(Cont'd from page 9)

and a feather in the cap of the Rockwell management and technology efforts. It had brought Rockwell hundreds of millions of dollars of profitable business, but even that landscape was succumbing to the high levels of integration brought on by Moore's Law and the death of the FAX machine.

Now we get to the other half of the Happy Ending of the story. At the turn of this century, the Rockwell International Corporation went through a "Spin Out" process, breaking itself into two separate publicly held companies - Rockwell Collins and Rockwell Automation. Rockwell International had concluded that the individual entities could make better decisions and be more responsive to their own, and customer's, needs if they were stand-alone entities. On June 29, 2001, Rockwell Collins was again the master of its own future. That following Monday, July 2, 2001 - at the start of business on the New York Stock Exchange - the old Collins Radio NYSE call of "COL" was once more on the Big Board.

During that 22 year span between the merger of Collins Radio and the eventual spinout (and rebirth) of Rockwell Collins, Inc., the company remained - other than strategic divestitures and acquisition - relatively intact. Collins' core technologies, and more importantly the culture of excellence of its people, products and quality survived.... but now infused with the Rockwell business culture.

In spite of the markets exited, sales over those 22 years grew from \$350M the year just prior to the merger, to an astonishing \$2.5B in 2002 (the first report year after the spinout), and then to \$4.73B in 2012 - the last reported year. What is really impressive is the fact that, even given the flat sales following the 2008 collapse of the global financial markets, the Rockwell Collins margins and reported Net Income as a percent of Sales (before taxes) have remained at an average 13.2%. Contrast this to the much lower returns of the Collins Radio Company of the late 60s where "good" Net Income returns were in the 3% range and, in bad years, they went negative.

Editor's Note:

There are many stories here that have gone untold, or summarized, due to space limitations. Following this series of four 80th Anniversary Issues of the Signal magazine, there will be expanded versions of this "era" history that will be placed on the Collins Collectors Association website at collinsradio.org. Specifically the stories of the management structure that ran continuously spanned from the Collins Radio days until the rebirth in 2001, the longer version of the MODEM story and the here untold story of GPS, will be added to the historical perspective. There are, as you might expect, some fascinating details imbedded within those summary financial numbers shown above.



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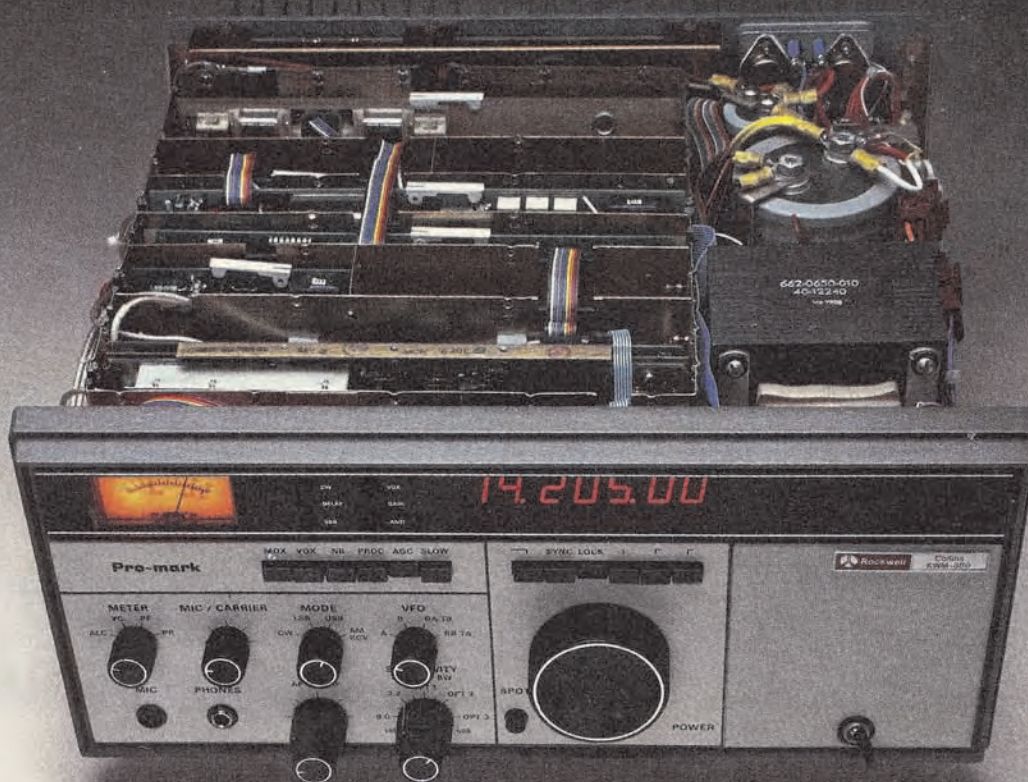
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The real beauty of the Collins KWM-380 is behind the panel, not on it.



At Collins, we know serious amateurs won't settle for less than professional performance. So we build every KWM-380 to commercial rather than amateur standards. For example, our PC boards are connected by ribbon cables with gold-plated pinfield connectors. The boards themselves are all glass epoxy, and virtually

Once built, every KWM-380 undergoes 24-hour burn-in, then is aligned and tested to meet or exceed every spec on the data sheet. Which makes us very confident about warranting your KWM-380 for one full year.

The result is a radio with superior performance and lasting quality, not front-panel glitter. Frequency stability is just one example of its beauty: typically, drift is as low as 10-12 Hz per hour for normal ham shack environments. Other companies haven't matched our performance because they don't match our quality behind the panel.

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