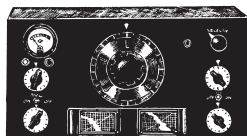


THE COMMUNICATIONS RECEIVER

EDITED BY **WILLIAM FIZETTE, W2DGB**, RR 1, BOX 55, HENRYVILLE, PA 18332

PLEASE INCLUDE SASE FOR REPLY.



The 1937 National NC-81X

In the last issue, we reviewed National Company slide-rule dial receivers. This column deals more detail with the NC-81X, the amateur-band version of the NC-80X general coverage receiver. Both radios came about as the result of a search for a design that could fill the slot once occupied by the FB-7, and that would feature low price with high-order performance.

As had come to be expected of the National Company products, the radios that emerged featured some new and unique design ideas. Foremost among these was a wide-range crystal filter and a high-frequency i.f. The other goal was also met; the receivers were indeed relatively low in price, a welcome development to cash-strapped amateurs in the lean years of the 1930s.

History

In *QST* for June, 1937, James Millen of the National Company wrote that James Bacon of his staff was working on a design for a low-priced communications receiver to supersede the famous FB-7, by now obsolete. One key feature that emerged from the research was the concept of a high-frequency i.f. (1560 kHz). Besides eliminating images, the feature made it possible to incorporate a wide-range crystal filter, continuously variable from 300 cycles to 7 kc, which could be left in the circuit at all times. (If you wish to read further, see the article by Dana Bacon in *QST* for September 1937.)

Another striking change from the general design parameters of the times for communications receivers was the use of an AC-DC circuit, made possible by a new beam-power amplifier which would give two watts of audio at a low plate voltage. Two models were announced in the September 1937 issue of *QST*, the general coverage NC-80X and the amateur version, the NC-81X.

To cut costs, the power transformer, the r.f. stage, and other amenities such as an S-meter were omitted. A sliding coil tray taken from the NC-100 design was used, but it was considerably simplified, having only a ten-compartment cast aluminum base and a thin aluminum cover plate.



The National 81-X amateur band receiver.

The standard National PW dial and gear box were replaced with a slide-rule dial and a stamped-steel gear box containing a two-speed drive, giving 16 to 1 for quick tuning, and 80 to 1 for broadcast use (*National Catalog*, 1937 edition.) A nice design touch was the use of a mirror strip on the scale, used with the knife-edge pointer to minimize parallax error.

In researching this article I became curious about the selling price of \$88.00 amateur net as compared to some other ham receivers of mid-1937. The Patterson PR-15 sold for \$109.50; the HRO for \$179.70; the NC-101X for \$129.00; the RME-69 for \$151.20; the Super Skyrider for \$99.00; and the ACR-155 for \$74.50. The Patterson, the NC-101X, and the RME did include a speaker in the price. The ACR had the speaker built into the cabinet. The NC-80/81X sets included a speaker "chassis," that is, the speaker frame without the metal cabinet, which had to be purchased separately. It would appear that the -81X was indeed price-competitive.

One interesting side note regards Millen's efforts to cut costs by using a good quality off-the-shelf BC tuning capacitor. The substitution failed due to backlash and other problems. To meet delivery schedules, they were able to use a few in

the first NC-80X receivers by careful refitting, but that brought the costs up to the level of the standard National PW capacitor. Subsequent production used the National units.

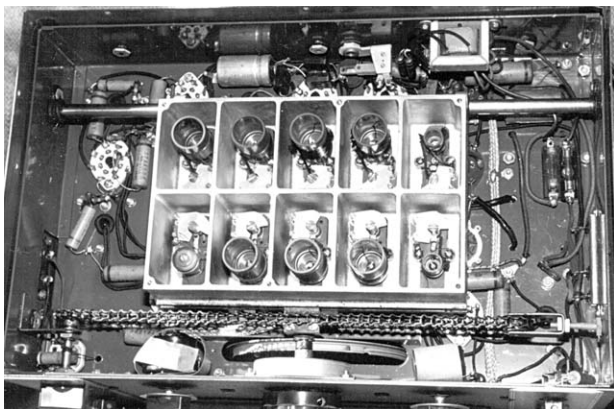
Another observation on Millen's cost-cutting revolves around his use of an AC-DC circuit. At first glance, this is a hallmark of a "cheap" radio. If you remove a power transformer from a circuit, you will save not only the cost of the transformer but also the cost of installing it. Millen's argument (*QST* September, 1938) was that performance considerations took precedence, and that a good AC-DC circuit has many advantages over a transformer-operated circuit.

Among these was absence of transformer-generated heat and hum, improved regulation, and increased stability on the higher bands. Millen also pointed out that there were significant extra costs in insulating the chassis from the outer cabinet. The implication was that the AC-DC circuit was more expensive than the alternative. Without the numbers it is difficult to comment further.

Restoration

The -81X that I was privileged to work with was in good shape and appeared to have been well taken care of. The only servicing that had been done was limited to replacing the filters and one additional capacitor. Additionally, the previous owner apparently did not have a matching speaker, so he wired an output transformer into the circuit under the chassis. Other than that the set was original.

I elected to leave the production capacitors and resistors in place, on the basis that (1) the radio is somewhat rare, and (2) if we rework all the radios, the next generation of owners won't know what an original set looked like in its entirety. (Who wants to take off the bottom plate of an unusual old set and see an assortment of or-



Views above and below the chassis show that the legendary National quality construction is evident even in this relatively inexpensive set.

ange drop capacitors?) After I reformed the filter caps, I was able to get the receiver to work, even with the 65-year old parts, and AM and SSB stations could be copied.

I examined the set carefully for signs of other cost-cutting measures, and was unable to find anything. All sheet metal and all components were of the same high quality as used in the expensive HRO and -100 series receivers.

One interesting observation was that each of the five amateur bands of the day began at precisely at 10 on the dial scale, and ended at 90. Of course that was one of the hallmarks of National precision, and is also evident in the HRO coils.

If you will refer to the diagram you will see an alternate power circuit with an isolation transformer. This set did have the transformer, converting it from an AC-DC receiver to a strictly 115 v.a.c. model. Production versions had the same hot-chassis isolation construction that was

described in the recent article on the National NC-44, protecting the user from AC line hazard. Both the top and bottom plates were screwed on, requiring conscious effort to get into the "hot" chassis inside.

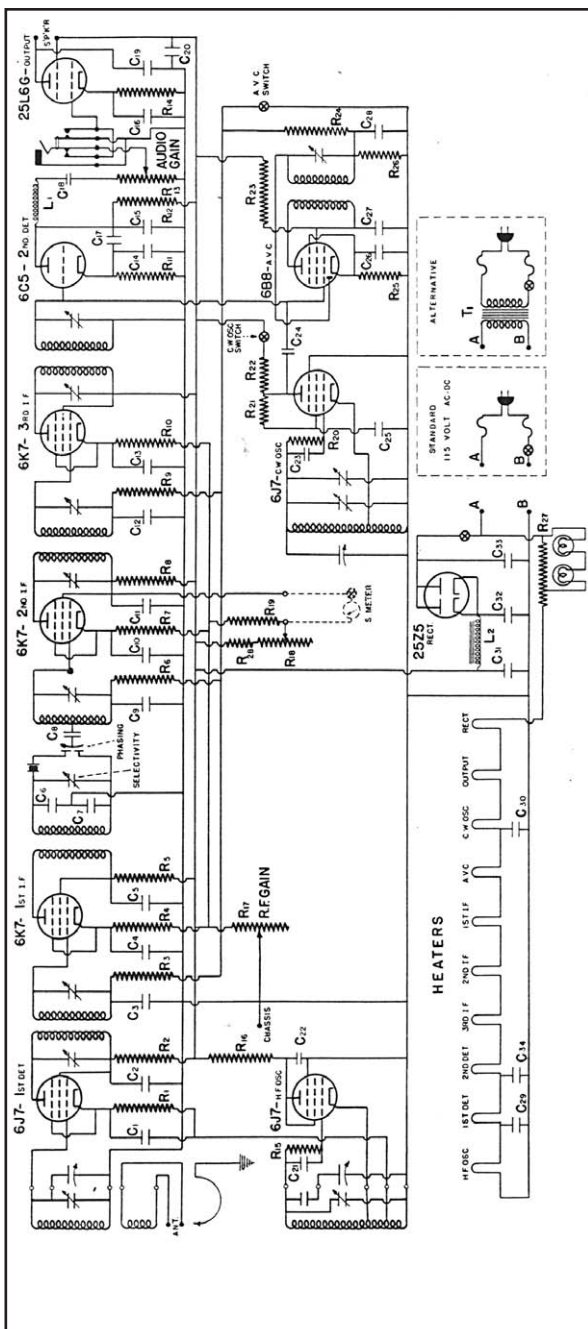
Performance

With a properly matched antenna input, the three i.f.s, and the wide-range crystal filter, this receiver must have done a good job on the low-frequency amateur bands of the 1930s. Millen also claimed that the increased stability resulting from the well-regulated power supply (40 mF of filter capacitance) led to "remarkable" performance on ten meters, and that the -81X would hold its own there against any receiver on the market. An out-board preselector might have helped on the higher bands, but amateurs of the day were notorious home-brew artists and that should not have been a major problem.

In Closing

The concept engendered during the 1930s that AC-DC radios were "cheap" arose when the need for low-priced broadcast radios became very evident in if the radio manufacturers were to survive the Great Depression. The little AC-DC sets that resulted were indeed "cheap" when compared to the Atwater-Kents and other pricey radios of the day. Yet they worked quite well on the BC band, and a lot of them were sold. The association of AC-DC design and cheapness stuck, however, and National had to overcome that perception.

The -80X and -81X were good quality communications receivers with unique design features, including the AC-DC circuit. A well-built ten-tube receiver, using quality parts, with a wide-range crystal filter, three i.f.s, complete



Schematic of the 81-X. Note that a factory-installed isolation transformer (bottom right) was an option.

with speaker, and weighing around 40 pounds can hardly be considered cheap, even though it sold for only \$88.00. And if a user was really concerned about the AC-DC feature, for a few dollars more he could have an isolation transformer installed.

However, technology and world events moved forward, and a year later the set was listed at \$99.00 net, still a very acceptable price. The last significant advertising that I can find is in the January 1939 *QST*. By May of 1939, Jim Millen had left the National Company and the -80X and -81X quietly faded out, to be replaced by lower-quality and lower-priced pseudo-communication receivers, such as the NC-44.

But Millen and his team had managed to come

up with another extraordinary design in a remarkable series of communications receivers. One wonders what might have happened if he had stayed with National, and been given free reign to develop more of his unique ideas.

Those who would like to read more about the National NC-81X might like to look at John Dilks' "Old Radio" column in the April, 2002 issue of *QST*. ☐

REFERENCES

Millen, James Letters in *QST*, 1937 and 1938
Hanlon, James T., W8KGI Personal communication.

AWA NEWS, continued from page 9

the Society at P.O. Box 82379, Portland, Oregon 97282-0379.

•Oklahoma Vintage Radio Collectors—Meets second Saturday each month, Hometown Buffet, 1012 S.W. 74th St., Oklahoma City, OK. Visitors welcome. Dinner/socializing, 6 p.m.; meeting at 7 p.m. Membership, \$12/yr., includes monthly *Broadcast News*. Info: SASE to OKVRC, P.O. Box 50625, Midwest City, OK 73140-5625; or call (405) 755-4139 or (405) 732-6070; or e-mail fkarnier@mmcable.com.

•Ottawa Vintage Radio Club—Meets monthly (except June and July) in Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario. Contact: Tom Devey, 601-810 Edgeworth Ave., Ottawa, ON K2B 5L5, (613) 828-5152. Membership: \$10 Canadian/yr.

•Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea market/contests in March, June, September, and December. An auction is included in September, and our annual

luncheon/program is held the first Saturday in December. Our newsletter, *The Pittsburgh Oscillator*, is published quarterly. website: www.nb.net/~schaefer/pars.html For directions, specific dates, information call President Bonnie Novak at 412-481-1563 or write to Karl Laurin, 8111 Sally, White Oak, PA 15131.

•Society for Preservation of Antique Radio Knowledge—Meets at 7:30 p.m. the second and fourth Tuesdays of each month in the party room at Cassano's Pizza Parlor, 1700 East Stroop Rd., Kettering, OH. Membership, \$18/year. Write SPARK Inc, P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call John Pansing at (937) 299-9570.

•Texas Antique Radio Club—Meets alternate months in Kyle and Shertz, TZ. Contact: Ron Manning, President TARC, 133 East Huisache Ave., San Antonio, TX 78212. Phone (210) 734-6831; e-mail ronmeg@gateway.net; website www.gvtc.com/~edengel/TARC.htm

AWA 50TH ANNIVERSARY COMMEMORATION

Your Help is Needed!!

The year 2002 is the 50th anniversary of the founding of the AWA, and we plan to issue a special supplement to *The OTB* commemorating our half-century history. It will be included with the upcoming May or August issue and selected material will also be posted on our web page.

The quality and historical depth of this publication will depend, in large part, on contributions from you readers. We can't do this alone and we need your input. If you are able to share stories, reminiscences, pictures, etc, about

AWA's activities over the years, please send them to me just as soon as possible. Don't be reluctant to include specialized subject material; there is a remarkable diversity of interests among our membership. All pictures and other material will be returned if a note requesting return is included.

Please address your contributions to: William Fizette, Project Coordinator, R.R. 1, Box 55, Henryville, PA 18332.

Questions? Contact me at w2dgb@enter.net or (570) 629-0637. ☐