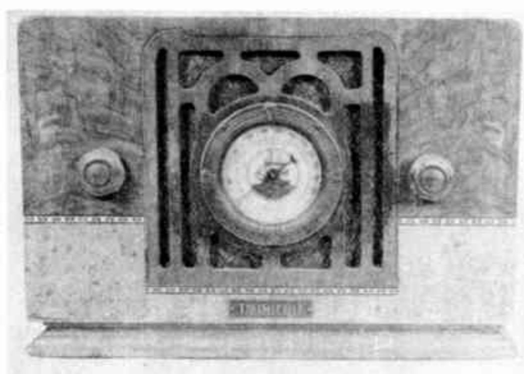
The Radio Collector

April, 1994

Evolution of the Broadcast Receiver

Part 4 - Downsizing for the Depression

At the close of last month's installment, we mentioned that the Depression of the 1930's provided great opportunities for the broadcasting industry. Kept at home by their lean pocketbooks, families gathered around the living-room radio to enjoy the free entertainment. Some of the most-loved and best-remembered radio shows of all time were created during this period.



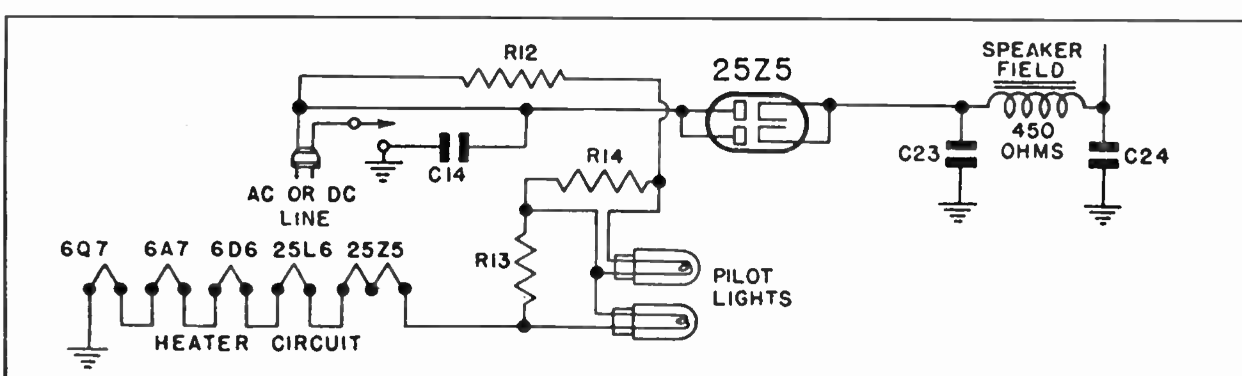
This little "Imperial" (manufacturer unknown), an early example of a scaled-down depression set, has a romantic look in spite of its up-tight design.

The market for radio receivers was brisk--provided that they could be sold cheaply. And the time was ripe to fill that need. Because radio technology was maturing, designers found it easier to do more with less. Moreover, because radio stations were becoming more powerful and numerous, they could be received on less sensitive equipment.

In their quest to produce less expensive radio sets, the manufacturers concentrated on eliminating expensive components and reducing physical size. Soon, a new generation of modestly-priced table models emerged, running perhaps one third the size of the original tombstones and cathedrals. The downsized sets were enormously successful, and hundreds of thousands of them were sold.

Attacking the Power Supply

As a first step in cost cutting, the manufacturers concentrated on eliminating two bulky and expensive power supply components: the power transformer and the filter choke. In sets made prior to downsizing, the power transformer changed the 110-volt alternating current available at the wall outlets of most homes into both lower and higher voltages. The lower voltages (6 volts or less) were needed to light the tubes; the higher voltage (usually in the 250- to 350-volt range), after conversion to



Here's a typical "downsized" power-supply circuit. R12 is a ballast; pilot lights are powered from a separate tapped resistor (R13-14). Note that a.c./d.c. line is grounded to chassis.

The Radio Collector
Volume 1, Number 4

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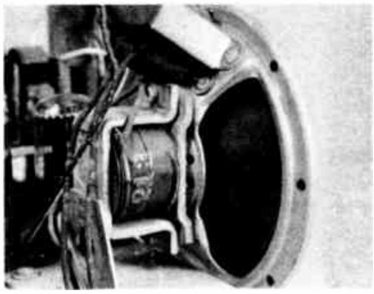
the required direct current, provided the necessary plate and grid voltages.

The job of rectification (changing alternating current to direct) was done by a vacuum tube. But the direct current produced by a rectifier is *pulsating*; that is, it changes rapidly and regularly in value. Without further processing, such current would create a loud and annoying buzz in the loudspeaker. A *filter* circuit following the rectifier tube was needed to smooth out the pulses, producing direct current of a constant value. The filter choke served as part of this filter circuit--which combined the properties of inductance (provided by one or two chokes) and capacitance (provided by two or more capacitors) to accomplish the necessary smoothing. However, thanks to a couple of technological innovations that had been recently made, separate filter chokes would no longer be needed.

One was the development (discussed last month) of the *dynamic* (d.c.-powered) loudspeaker. The speaker's electromagnetic field coil, electrically identical to a choke, could be substituted for the choke in the filter circuit. And as it worked in the filter, the field coil would also be receiving the d.c. voltage necessary to energize it for operation in the loudspeaker.



Dynamic speaker's field coil doubles as filter choke.

The other innovation was the development of practical *electrolytic* capacitors--which could be made in much higher values than the non-electrolytic versions. The electrolytics were inexpensive and compact. And they could be made in high enough capacitances to allow the set designers to reduce the amount of inductance used in the filter circuit--paving the way for the speaker field - filter choke substitution just discussed.

Series String Heaters

Dealing with the choke was easy, but getting rid of the power transformer would be a little more difficult. For one thing It involved devising a new way to light the tube heaters.

Tube heaters of a.c.-d.c. sets are in series. Ballast resistor, if present, looks like a metal tube (see text).

In traditional radios, as we've said, the power transformer converted the 115-volt line voltage into the much smaller voltages (generally under 6) needed to operate the heaters. Now these heaters would have to be operated directly from the a.c. wall plug. That was accomplished by wiring the heaters in series, much like the lamps on an old-fashioned Christmas tree set.

By wiring several tubes in series, the required operating voltage became the sum of the individual heater voltages. But even that sum didn't come close to 110, the approximate figure required if the series string was to be connected across the line without blowing any tubes. So the string also had to contain a series resistor to drop the voltage still further.

The resistor sometimes took the form of an asbestos-covered third wire included in the radio's line cord;it was also sometimes installed as a *ballast*, which consisted of the appropriate resistance housed in a metal enclosure that plugged into the chassis like a tube.

Special tubes with higher-voltage heaters (like the 25-volt types 25Z5

(continued on p. 4)

INFORMATION EXCHANGE

This is an open forum for interaction among our readers. Here you can ask questions about some aspect of our hobby, answer a question that's been posed or pass along other information of general interest. Send your questions, answers and information to **The Radio Collector**, P.O. Box 1306, Evanston, IL 60204-1306. Submissions may be edited or paraphrased.

QUESTIONS AWAITING ANSWERS

1. Is there available a publication that describes a source of low-frequency crystal material and a method for grinding crystals? I am looking for a pair of crystals to use as 452.5 and 456.5 kc markers in a sweep generator described by Rod Schrock in an issue of the AWA Old-Timer's Bulletin. The crystals and their holders are now obsolete, but if I could get the materials, I might be able to make what I need. I understand that the old-time ham operators used to grind their own crystals.

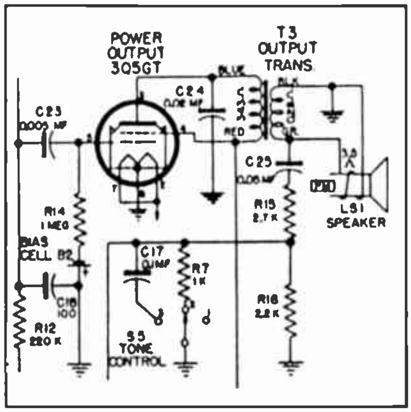
2. What is the best method of determining the capacity of an unmarked variable capacitor?

3. I've acquired a home-brew 3-tube battery set put together with No. 14 insulated wire that looks as if it was pulled from some old-style BX cable. It seems to be correctly wired, but does not work. For one thing, the tuning capacitor is about as far away as it can be from its associated coil. The cabinet is solid mahogany and the transformers and tubes are good. Should I could leave it as a horrible example, part it out, rebuild it using appropriate construction techniques or. . .? -- Alton A. Dubois, Queensbury, NY.

GENERAL INFORMATION

More On Bias Cells

Steve Kalista (Jim Thorpe, PA) sends us a schematic showing how a Mallory cell provided grid bias for the 3Q5 power amplifier stage of a General Electric Model 250 a.c./portable receiver. When portable, the set operated from an internal Willard 2-volt wet cell and vibrator high-voltage supply. A built-in charger pumped energy into the battery when the set was operating in a.c. mode.



Steve's Kalista bias cell example.

Speaker Expedient

Many times a speaker is gritty sounding because of dust in the space between the voice coil and the magnet pole pieces. Right after World War II, when parts were very scarce, the radio service man I worked for developed a method for treating such speakers.

Using a solvent (*Mineral spirits, rubbing alcohol or lacquer thinner might work -- Ed.*), he dissolved the cement holding in place the voice coil cover, the flexible spider beneath it, and the outer rim of the cone. Unsoldering the voice-coil leads, he lifted the cone and coil out of the frame.

Next he made a dust-removal tool by wrapping a piece of Scotch Tape (double-sided is good) over a piece of photographic film. Pushing the taped film between the poles of the magnet, he picked up the dust and metal particles that had accumulated there.

To center the cone around the magnet during replacement and re-cementing, he used quarter-inch strips of film as temporary shims. Incidentally, the big older speakers were easier to dismantle because the spider was usually held with screws rather than cement.

Before attempting this procedure on a restoration project, I'd suggest that you practice first on a burned-out speaker or one that you don't really need! -- Alton A. Dubois, Jr., Queensbury, NY.

Tuning Eye Substitute

Magic-eye tuning indicator tubes become dim after long use, and replacements for the types 6U5, 6G5 and 6E5 types generally found in vintage sets used are becoming expensive and difficult to obtain. The military surplus 1629 tuning eye tube is much more plentiful and can often be picked up for $5.00 or so. With a little work, the 1629 can be used as an acceptable substitute for the rarer types. There are two problems to be solved: (1) making an adapter so that the octal-based 1629 can be plugged into the 6-pin 6U5/6G5/6E5 socket and (2) arranging for a 12-volt filament supply for the 1629 (the other types operate on 6-volts).

To make the adapter, you'll need the 6-pin base from the defective tuning-eye tube and an octal tube socket. Remove the glass and cement from the tube base and desolder the leads from the pins using a small torch or a hefty soldering iron. Make sure that all the solder is removed from the pins; you should be able to see light through each one. *(Desoldering braid from Radio Shack might be helpful here--Ed.)*

Now remove the metal mounting rim from the octal socket. Depending on the socket style, you'll have to do a little bending, filing or grinding to remove the little retaining ears. After you've done this, make up six leads from solid wire (No. 22 or so), each about 5" long.

The directions that follow require you to identify pin numbers on both the six-pin tube base and the octal socket. To identify pin numbers on the tube base, hold the base pin-side *towards you with the two fat pins pointing down. The pins are numbered clockwise from one to six, starting with the left-hand fat pin and ending with the right-hand fat pin. To identify pin numbers on the octal socket, hold the socket solder-lug side towards you with the positioning key pointed down. The pins are numbered clockwise from one to eight, starting with the lug just to the left of the key and ending with the lug just to the right of the key -- Ed.*

Solder the leads to pins 2, 3, 4, 5, 7 and 8 of the octal socket. Slip a half-inch length of flexible insulating sleeve ("spaghetti") over each of these leads. Now thread the leads through the appropriate pins in the 6-pin socket as follows (first number refers to the octal, second to the 6-pin): pin 2 to pin 1; pin 3 to pin 2; pin 4 to pin 4; pin 5 to pin 3; pin 7 to pin 6; pin 8 to pin 5.

Pull the leads through the pins so that the octal socket is tight against (or maybe even seated inside) the six-pin tube base. Check for proper pin-to-pin continuity with an ohmmeter. After the connections check out, pull the octal socket back a bit, apply some epoxy cement, pull tight again and solder the leads into the pins.

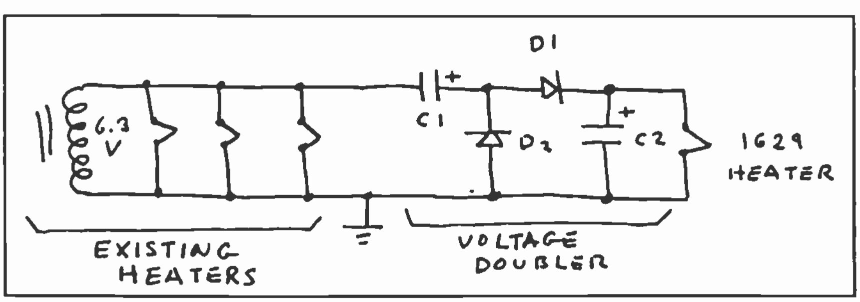
CAUTION: Before you start all this, make sure you have enough room on the chassis for the extra length the adapter adds. If not, and you still want to go ahead with the substitution, you'll have to change the socket on the set (I can hear the purists screaming now).

To make the change, remove the wires from the set's six-pin socket one at a time and transfer them to an octal socket for the 1629. The 6-pin socket numbers are determined like the 6-pin tube base numbers: clockwise from fat pin to fat pin with the lug side of the socket facing you. Transfer the connections in reverse order to that outlined above: pin 1 (6-pin) to pin 2 (octal); pin 2 to pin 3; pin 4 to pin 4, etc.

You may find a couple of the pins on the original socket jumpered and wired to only one connecting lead instead of two. Don't be concerned; just transfer each wire (or pair of wires) on the six-pin socket to its equivalent position on the eight-pin socket. You may well also find a resistor mounted in the old socket. Be sure to transfer this, too, to the appropriate pins on the eight-pin socket.

The resistor mentioned is a plate dropping resistor and is usually intended to be 1 megohm. In many sets, this component greatly increases in value over time, inhibiting the action of the tuning eye. It would be well to determine the proper value (either from its color coding or the set's schematic) and check it with an ohmmeter so that, if necessary, it can be replaced with a new one when making the transfer. As a matter of fact, it would be well for you to check, and if necessary replace, this resistor before deciding to discard your original tuning eye tube! -- Ed.

To obtain 12 volts for the 1629 heater, you need to trace back the leads running to the heater connections of the 6-pin socket (pins 1 and 6, which are the two fat pins) and disconnect them from their connection to the 6-volt heater line under the chassis. Wire up the simple voltage doubler circuit shown on the accompanying schematic, connecting the input to the 6-volt heater line and the output to the heater leads you just disconnected, as indicated. -- Bob Zinck, Halifax, N.S., Canada.



Bob's voltage doubler. D1, D2 are 1N4001 diodes; C1, C2 are 1000 mfd., 25v.

"EVOLUTION"
(continued from page 2)

and 25L6) were developed for transformerless service during this era, but you'll also run into 6-volt types such as the 43, 6A7, 6D6, 6Q7, etc.

Besides lighting the tubes, as you'll remember, the power transformer also provided 250-350 volts of alternating current that was rectified and filtered to provide operating voltages for the tubes' plate and grid circuits. Without the transformer, only the 110 volts provided at the wall plug was available for this purpose, so receiver circuitry had to redesigned to work on the lower voltages. However, for reasons already discussed, the resulting performance was more than adequate for most listening situations.

The little depression radios were also known as a.c.-d.c. sets because, thanks to the lack of a power transformer, they would operate on either type of line voltage. Back in the 1930's (and even later), the downtown areas of many cities were powered by direct current. A.c.-only sets required costly power inverters to operate in these areas, so the power versatility of the a.c.-d.c.'s was an additional selling point.

These radios are fun to collect because their (generally wood) cabinets were produced in a variety of fanciful styles, and their small size makes them easy to display and store. Treat the sets with extreme caution when you plug them in, however. Because the operating voltages are derived directly from the a.c. line, you can receive a nasty shock by touching the chassis, control knob shafts, or any other metal parts. For more information on a.c.-set safety, see the safety article that was featured in our pilot issue.

Next month, we'll follow the evolution of the a.c.-d.c. set into the 1940's and study the further electrical and physical transformations that took place in this very popular and long-lived receiver design.

MARC F. ELLIS

PLAY IT AGAIN!

A No-Nonsense Course in Radio History, Evolution and Repair

VACUUM TUBES OF THE 192O'S

Formation of RCA

The post World War I development of tubes in this country was spearheaded by the Radio Corporation of America (RCA), which was formed in 1920 through a pooling of patents held by General Electric, AT&T and Wireless Specialty Apparatus (owned by United Fruit). This coalition was strongly encouraged by our government, which was concerned because, at that time, nearly all of the important wireless patents and facilities were controlled by foreign interests (Marconi).

AT&T joined mainly to protect its interests and benefit from the pooled knowledge, but soon went its own way and did not participate in the development of broadcast radio. Westinghouse joined in 1921. RCA also took over the American Marconi facilities and patents. Exactly how Marconi was induced to sell has never been revealed.

During its first decade, RCA manufactured nothing. It operated the wireless stations, sold the members' products under the RCA label and owned nearly all the useful tube and circuit patents.

Birth of the 201A

In late 1920 RCA released its first tubes, the UV200 and UV201. The UV200 was a special detector tube, and is rarely seen by the collector, but the UV201 became the workhorse of early broadcast receivers. It was a triode with a filament rated at 5V/1A to operate from a 6-volt automobile battery. The excess voltage from a fresh battery was dissipated in a rheostat, which could be adjusted to maintain proper filament voltage as the battery voltage dropped.

By 1923 filament improvements had reduced the current consumption to 0.25A. An "A" suffix was added to identify such tubes, and the UV201 became the UV201A. These tubes had a brass base with four stubby contact pins of equal size set in a ceramic wafer on the bottom. The socket was a large bayonet affair with a slot that engaged a locating/locking pin on the side of the tube. The tube was pushed down against contact springs in the bottom of the socket and locked in with a slight twist.

In late 1924 the expensive brass base was changed to the familiar molded Bakelite base. In 1925 the pins were lengthened so that a cheaper wafer "plug-in" socket could be used. Two of the pins were made larger than the others to position the new tube correctly in such sockets. The locating pin was retained, however, and repositioned so the new tube would still fit the old bayonet socket. Tubes made with this new base were given a "UX" prefix, so the UV201A became the UX201A.

Dry Cell Tubes

Other tubes were developed during this period to go with other power sources. The WD-11 had a 1.1V filament for operation from a single dry cell. It had a unique base and was used in early sets like the Radiola III. The WD-12 was a standard UV-base version of the WD-11 and the WX-12 was a UX-base version. The UV- and UX199 had a 3.3V filament for use with 3 dry cells in series. Although not apparent from the nomenclature, the UV/UX199 base was smaller in diameter than the UV/UX201A base and unique to this tube. The UV/UX201A and the UV199 were used in the majority of battery receivers made from 1922 to 1930.

Two other 5V battery tubes were developed. The UX112A was released in 1925 to provide slightly more power in the audio output stage and the UX171A, a still more powerful audio output tube, was released in 1926. In 1932 all prefix letters and numbers were dropped. The UX201A became simply the 01A. The WX-12 became the 12 and the UX112A became the 12A. Don't confuse the 12 and 12A; they are completely different tubes.

AC Tubes

By 1926 there was great demand for AC-powered radios. Batteries were messy and expensive and battery eliminators cumbersome. Battery tubes wouldn't work on AC because they introduced loud hum into the signal. The hum was caused by the electrostatic field of the AC filament voltage and the electromagnetic field of the filament current. If the two were balanced, hum was low and acceptable.

The UX226 (26), issued in 1927, had a filament rating of 1.5V/1.05A, which was one of the possible voltage/current combinations providing such a balance. Since the AC-heated 26 did introduce hum when used as a detector, the UY227 (27) was developed. UY denoted a 5-pin base. In this tube the electron stream was not directly generated by the filament, but by an oxide-coated metal sleeve, called a cathode, that surrounded it. The cathode was raised to operating temperature by the filament, but was electrically insulated from it.

A filament providing electron emission indirectly, in this manner, is called a heater. The thermal efficiency of this arrangement was low, requiring more power for adequate emission, so the heater was operated at higher voltage and current (2.5V/1.75A). Since audio output tubes are not as sensitive to filament-induced hum, the UX171A, originally developed for battery use, also worked well in AC sets. Completing the complement of tubes used in the early AC receivers was the UX280, which was developed as a rectifier to convert high-voltage AC from the receiver's power transformer to the DC required by the vacuum-tube circuitry. Rectifier filaments were standardized at 5V and generally remained so. Millions of radios were made in 1927 and 1928 using the 26, 27, 71A and 80 tube lineup.

The Tetrode

The next major advance in tube design was the development of the four-element (tetrode) tube. Prior to that time all amplifier tubes were triodes (3-element tubes containing a control grid, plate and filament or heater). The triodes had problems as radio frequency amplifiers. They tended to oscillate and squeal due to feedback through the grid-plate capacitance, which we will cover in later columns.

This problem was eliminated in the UY224 tetrode (1929), which contained an extra grid (the "screen") that was grounded for RF and placed between the control grid and the plate. The gain of this tube was also much higher. Two tetrodes

(continued on p. 8)

CORRESPONDENCE FROM OUR READERS

Letters may be paraphrased, shortened, or otherwise edited so that everyone gets a chance at the floor!

Dubilier Lore

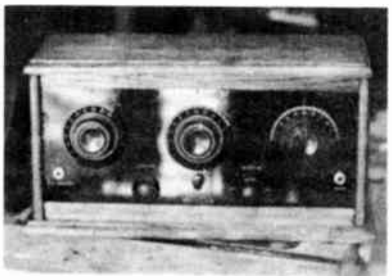
In answer to last month's Mini Quiz, Alan Douglas (Pocasset, MA) correctly responded that the answer we were expecting to get was William Dubilier. But he went on to point out that it was the high-voltage (transmitting) mica condenser that Dubilier developed. Alan is sure that mica had been used in lower-voltage applications long before. He goes on to point out that, though he's willing to give Dubilier the credit, there's some doubt about whether that inventor was solely responsible for the development of the high-voltage mica.

To back up his points, Alan sent along photocopies of some very interesting documentation, including a 1919 pamphlet detailing the development of the mica capacitor and published by the Dubilier Company itself. According to the discussion therein, Dubilier condensers had been developed as much more compact and sturdy substitutes for the previously-used Leyden jars (!). Transmitting, and other high-voltage, applications were definitely stressed. The included product catalogue listed units with capacitances ranging from .001 to .004 mfd. and working voltages between 15,000 and 21,000. Also in Alan's package were excerpts from 1920 and 1921 issues of "The Radio Review" documenting the mica condenser patent battle that was waged between the Dubilier interests and the Wireless Specialty Apparatus Company.

An interesting sidelight on Dubilier was provided by a couple of articles from 1911 issues of "The Electrician." These detailed an experimental wireless transmitting station then recently erected by Dubilier on Puget Sound near Seattle. The guyed, 320-foot wooden antenna tower rose 820 feet above sea level and supported the apex of an "umbrella-style" antenna system containing about 40,000 feet of stranded phosphor-bronze wire. The operating room included experimental transmitting apparatus for both telegraph and telephone, the latter including a water-cooled, double-diaphragm, microphone designed to handle high currents. Thanks for the info, Alan!

Show and Tell Time!

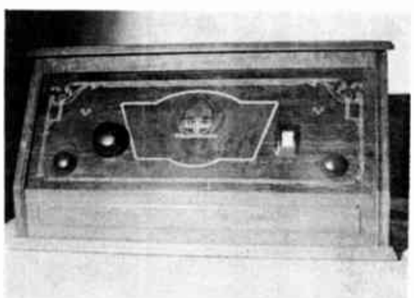
Reader Steve Kalista (Jim Thorpe, PA) inspired by the photo of the "Scratch built" cathedral sent in by Willy Young last month, sent along this shot of his recently-acquired Freshman Masterpiece. The set began life as a console but, thanks to some good work by a local cabinet maker (using old Freshman advertising photos as a reference), is now a table model. The



Steve's re-housed Freshman

Freshman had been offered to Steve for shipping costs only, but these were going to be prohibitive if the massive cabinet were to be included. So Steve requested just the chassis, then commissioned the construction of the table-model cabinet. Costs were only about half of what the shipping of the existing cabinet would have been. This strategy might upset purists (such as myself!), but the newly-outfitted set is certainly going to be easier to display and store!

Alton A. Dubois, Jr. sent along a couple of shots of his handsome Airline Model 15. Circuit-wise, the set is a standard 5-tube battery TRF using the usual 01-A's. But this radio does sport some advanced physical features. For one thing it's not a 3-dialer, having just one tuning indicator (note window at right-center of panel). And the interior



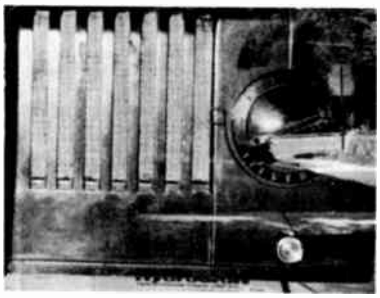
Alton's Airline Model 15

view (maybe we can run that next month) reveals what appears to be a ganged 3-section tuning capacitor.

In spite of its brand name, this radio was apparently not a marketed by Montgomery Ward. Rider's does list a Montgomery Ward *Airline 15*, but that receiver is a completely different, a.c.-operated design. Alton theorizes that the manufacturer of his Model 15 might have been an early contractor for Wards and the source of the "Airline" name associated with the company's consumer electronics products.

Hot Chassis in Disguise

While we're talking about products of the mail-order giants, take a look at this cute, but treacherous, Sears Roebuck Silvertone 4500 brought to our attention by Steve Kalista. This radio is



Cute, but treacherous, Silvertone

a.c.-operated and looks like a relatively harmless transformer-powered set, but its chassis presents the same shock hazard as the notorious a.c.-d.c. sets (see last month's "Correspondence" Column and the article "Safety for Restorers" in our pilot issue).

The source of the hazard, which has probably knocked many an unwary serviceman off his pins, is that the receivers power transformer is of the autotransformer type. Rarely used in radio-set power-supply circuitry, the autotransformer has only one winding--which is tapped for both primary and secondary voltages. Without separate windings for the primary and secondaries, the a.c. line is not isolated from the radio chassis and, depending on the orientation of the power plug, full line voltage can appear between the chassis and ground.

The moral: before working on any plugged-in radio, check for a.c. voltage between the chassis and ground. Even normal transformer-powered sets can develop hot chassis problems through failure of one of the noise-filter capacitors often connected from line to ground.

VINTAGE BOOK REVIEWS

Books from the era when vintage radios were new! Look for them at swap meets, flea markets and used book stores.

AN HOUR A DAY WITH RIDER ON RESONANCE AND ALIGNMENT, by John F. Rider. Published by John F. Rider Publisher, Inc., New York, NY 1936. 91 pages. Hardbound.

This review will be the first of four covering the *An Hour a Day With Rider* series. The books were intended as a sort of continuing education course for radio servicemen. By the mid-1930's, many servicemen who had received their training just a few years earlier were having difficulty understanding some features of the modern, more complex, sets.

In the midst of the Depression, however, few radio repairmen could afford to take time off from work to upgrade their training. Nor could manufacturers continue to provide free instructional materials. The *An Hour a Day* series provided an inexpensive and convenient way for a working serviceman to invest a little time in upgrading his knowledge.

For the vintage radio collector, probably the most interesting and useful of this series is *An Hour a Day With Rider on Resonance and Alignment.* The first chapter explains how and why a circuit resonates and how a tuned circuit works. This phenomenon, very mysterious to many radio collectors, is explained in a clear and easy-to-understand manner.

This chapter accounts for about one-third of the text. Every form of resonant circuit that the serviceman (or collector) could expect to encounter is covered. Mathematics is used sparingly and explained simply and completely.

The second chapter covers the how and why of alignment procedure in a general way. The types of equipment needed are discussed, as is the need to practice good alignment techniques. The remainder of the book covers specific methods for alignment and neutralization of TRF receivers as well as alignment of oscillator, r.f. and i.f. stages in superheterodyne receivers.

This book has much practical merit. Collectors often come across sets that some "kitchen table repairman" has thrown completely out of alignment by tightening all of the adjustment screws. Radios can also easily become misaligned through replacement of components. One cannot really how well a given set is capable of performing without peaking its alignment adjustments.

The book might seem elementary to those who have had technical training in radio receiver theory, but it is highly recommended to the vintage radio collector who wants to know a bit more about how his sets work and to learn the techniques for carrying out a professional quality alignment.

Conducted by Paul Joseph Bourbin

COMPANY CHRONICLES

Brief Biographies of Classic Radio Manufacturers

Stewart-Warner
Matched-Unit Radio
INSTRUMENTS TUBES REPRODUCERS ACCESSORIES

Originally called the Stewart-Warner Speedometer Corporation, this organization was put together in 1912 through a merger of two parent companies. The company manufactured a large line of automotive parts and accessories but, concerned that the automotive business might decline, began investigating the radio market in 1923.

Stewart-Warner's original concept was to manufacture a complete line of radio items in addition to completed sets. The early advertisements stressed that Stewart-Warner radios employed "Matched Unit" construction; all parts, tubes and accessories were "designed and perfected" by the company. The firm's original radio models were manufactured with parts purchased from Erla, however, and an early attempt to set up a vacuum-tube manufacturing operation ended in failure.

Nevertheless the company reported profits of $1.8 million on the sale of 100.000 radios in 1925, and was said to be turning out 1000 sets a day by February, 1926. About a year later, however, plagued by overproduction and excess inventory, the firm dumped 75,000 sets at $15.00 each. The following year, about a million dollars worth of obsolete sets were unloaded. At that time, the radio trade papers reported that the company's radio losses were being offset by profits from its automotive products.

Partly-demolished Stewart-Warner plant under wrecker's ball in March, 1994.

Stewart-Warner became a less conspicuous presence in the radio industry after that time, but continued to manufacture radios sets, and eventually television sets and phonographs, until 1954--when US production of these product lines was discontinued. The company continues to operate and grow today, maintaining diverse interests in such areas as military electronics, facsimile, furniture hardware, lubricating systems, heating and tools.

Stewart-Warner's mammoth Chicago plant was reported by a 1929 trade paper to contain a million square feet of floor space and employ over 5,000 skilled workers. The company vacated the facility in the early 1990's, moving most operations to the El Paso, Texas area. The buildings stood empty for a few years, and are now being demolished to make room for condo construction.

The information for this Company biography was largely obtained from Alan Douglas' three-volume encyclopedia "Radio Manufacturers of the 1920's," published by The Vestal Press, Ltd., Vestal, NY and copyrighted 1988, 1989 and 1991 by Alan Douglas.

PLAY IT AGAIN

(continued from page 5)

could replace 3 triodes. A quicker heating version, the UY224A, came out in 1930. The 24/24A had the same cathode construction, heater rating and 5-pin base as the 27, but had a cap on top for the control grid connection.

Next time we will finish the history of tube development and give you a chart showing the issue dates of many tubes to help you date your antique radios.

Ken Owens, 478 Sycamore Dr., Circleville, OH 43113

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WANTED

An original AM (+FM?)radio for 1965 Chevy P/U. Pay cash or trade tubes, other parts. David, 4016 Texana Way, Beale AFB, CA 95903. (916) 788-0624.

Graybar 310 receiver (like RCA Radiola 60) in decent working condition. Ed Doughty, 3865 N. Thomas Rd., Freeland, MI 48263.

Any Rider manuals or any Radio College of Canada manuals. Shayne Trowsse, R.R. 3, Box A3, Casselman, Ontario, Canada, KOA 1MO

Antique radio headphones. Also want any junk Tuska radios or parts. Highest prices paid. Dick Mackiewicz, 1549 N. River Rd., Coventry, CT 06238. (203) 742-8552.

Schematics and manuals for Realistic PRO2002 scanner. Will pay photocopying and mailing costs. Thanks, David. (916) 788-0624.

Schematics and service information for Zenith Model 105668. Donald L. Rapp, 745 Gettinger, Ste. Genevieve, MO 63670. (314) 883-7128.

Info or schematics on Crosley 739-A. G. Boston, 4341 Tahitian Gardens, Apt. #C, Holiday, FL 34691.

Heathkit DX-100 good condx. Will pay shipping. David, K4ZZB, 417 Rio Dr., Darlington, SC 29532. (803) 395-0414.

Chrome chassis radios by McMurdo Silver, Zenith, Lincoln, Scott (some). Also brochures & booklets on same. Have cash or excellent trades. Don Hauff, Box 16351, Minneapolis, MN 55416. 1-800-769-9980.

Jewell radio test panel Pattern 579. Finder's fee for non-seller. C. Orval Parker, HCR Box 133, Pocono Summit, PA 18346. (717) 646-2750.

Volume control for Crosley Model #124. Must be V.G. or N.I.B. replacement. Stuart Humphreys, 600-C Brookwood Ct., Blue Springs, MO 64014. (816) 229-4394.

Driver for A.K. Horn Speaker Model H. A.A. DuBois, Jr., 67 Peggyann Rd., Queensbury, NY. (518) 792-3130.

Schematic for an H.H. Scott 325R Stereo or Sams MDH-232 folder containing same. Charles Juedemann, 2015 Hickory Ridge Rd., Union, MO 63084.

Info on ac-dc sets, car radios, etc using 5-pin 6-volt tubes 36-37-38-39. Ray Larson, 12241 1/2 Gorham Ave., W. Los Angeles, CA 90049-5214.

Black Kurtz-Katch vernier dial (need the knob and shaft); Jewell pattern 135 d.c. voltmeter 0-5 or 0-8 volts, or any other two inch hole rear mount d.c. voltmeter. Paul Bourbin, 25 Greenview Ct., San Francisco, CA 94131.

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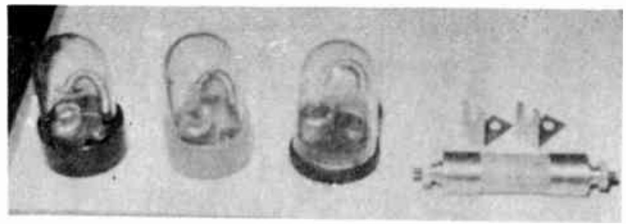
SERVICE DATA AND HARD TO FIND PARTS Original SAMS photofacts, TSM, CB, MHF, TR and AR. Manufacturer's Data, FREE Catalogue. A.G. Tannenbaum, P.O Box 110, East Rockaway, 11518. Phone (516) 887-0057. 24 hour FAX (516) 599-6523.

Alpha-numeric index to Stokes' book "70 Years of Radio Tubes and Valves." $3.50 each, postpaid in USA only. Anthony Jacobi, 8053 Maywood St., Ralston, NE 68127-3729.

First user-friendly circuit on early BC-348's. On two 8X14 sheets. Send $2.00 and three 29-cent stamps. Ray Larson, 12241 1/2 Gorham Ave., W. Los Angeles, CA 90049-5214.



Crystal Detectors, three models. Send SASE for details to: Dick Mackiewicz, 1549 N. River Rd., Coventry, CT 06238. (203) 742-8552.

Radio Parts. New and used tubes, test equipment, service data, 1000's of parts. Write your wants. SASE for reply. Krantz, 100 Osage Ave., Somerdale, NJ 08083-1136. (609) 783-0400.

Buying WWII military surplus radio sets and accessories. Highest prices paid. Over $6,000 cash paid in 1993. America's WWII radio surplus leader. Sam Hevener, W8KBF, "The Signal Corps," 3853 Everett Rd., Richfield, OH 44286-97623. (216) 659-3244 before 8 p.m.

Regency TR-1 radio schematic. Reproduction of the original factory blueline. $3.75 postpaid in tube. Paul Bourbin, 25 Greenview Ct., San Francisco, CA 94131. (415) 648-8489

MONTHLY MINI QUIZ

Match wits with our quiz editor! See next month's issue for the answer, as well as the names of all readers who responded correctly.

Around 1877 an ingenious German made the first microphone, thus giving electricity a voice.

Answer to last month's quiz: William Dubilier. Correct answers were sent in by Alan Douglas and F. Krantz.