

Updating The 75A-2

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With newer and "flashier" receivers appearing almost every month we often forget that a fair amount of engineering went into some of the older models too. Sometimes only a few modifications can produce a receiver comparable to or superior to any of the latest models. Described here are such modifications for the popular 75A-2 for s.s.b. use.

The sound of the banging screen door soon followed the entrance of my old friend, Sam Ham. Sam was moving like an irate TVI complainant was right on his heels!

"Look at this flier on the new *Regurgit-Eight* s.s.b. receiver", Sam bellowed in my ear, "This thing is so fancy it even has a sum detector" "Yup, it looks like about the last word in s.s.b. receivers, Sam", I replied trying to share his enthusiasm. I couldn't work up the same fever pitch, however. I was thinking of the price tag, and the last time Sam got a "crush" on a new model receiver. His wife had started a divorce action and named my Allied Radio Catalog as correspondent!

"It sure is a honey, Sam, but what's wrong with your old 75A-2", I said, trying to temper the situation? "Nothing that about 10 years, a product detector and a mechanical filter wouldn't fix", replied Sam, as he thumbed through his check book.

Our conversation took on a confidential tone as Sam and I had a father and son talk about receiver "facts of life". To be brutally frank, 90% of the receivers made today are nothing more than yesterday's newspapers set in a new type face. Each year the companies introduce new gadgets, a different box, and call it a "1960 model", just like the car manufacturers.

"Your old 75A-2 is an exception, Sam. When that job was designed there were only a few hardy souls on s.s.b., yet today it will still outperform most receivers! It's got stability (both mechanical and electrical) and calibration accuracy. The only thing it hasn't got is a mechanical filter and a product detector, and we can fix that situation in short order.

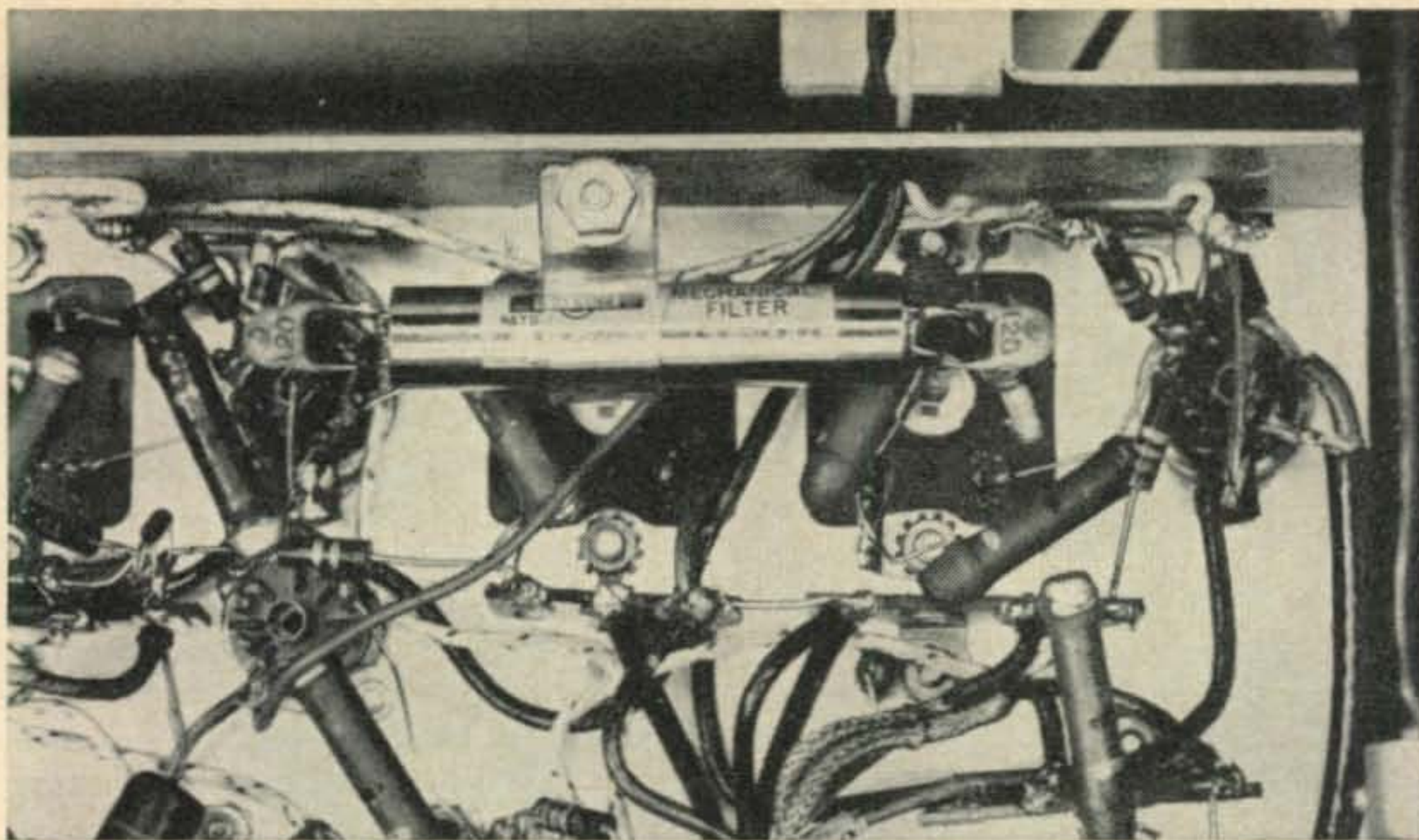
A furrow spread across Sam's brow as I hid his new catalog and replaced it with the 75A-2 schematic.

Filter Modifications

The first step was to decide where to insert the mechanical filter. Between the second mixer and the first i.f. was the crystal filter. This circuitry was retained and the filter was installed between the first (V_5) and second (V_6) i.f. stages. Connected in this manner, the filter determines the maximum selectivity (3.1 kc at 6 db). The crystal filter can still be used for c.w. reception, and provides the minimum bandwidth (200 cycles at 6 db down).

A small diameter, one inch long threaded $\frac{9}{32}$ inch pillar was fastened to the mounting bolt of T_5 closest to the shield plate. The filter was supported on this pillar (directly above T_4 and T_5) by a $\frac{3}{8}$ inch plastic cable clamp. Next C_{108} and C_{109} were disconnected from T_4 and T_5 (see fig. 1) and connected to the end terminals of the filter. A 120 mmf capacitor was soldered across each end of the filter to resonate the transducer coil. The remaining transducer winding lug and the ground lug on the filter can were connected together and grounded to the nearest solder lug. Finally C_{32} was removed (don't forget this step, or the signal will bypass the filter) and the secondary slug of T_4 (bottom) and the primary slug of T_5 (top) were screwed all the way out to shift the resonant frequency outside the i.f. passband. Incidentally, an attempt was made to use these two coils as skirt traps, but a few minutes experimenting proved fruitless.

After the primary of T_4 and the secondary of T_5 was resonated at the i.f., the receiver performed just like a 75A-4, as far as selectivity was concerned (actually the skirts are a little better, due to improved filter design). A.M. stations drop out the passband with a "ker-plunk". Sam complained that the signals sounded bassy, but I demonstrated that it was necessary to tune to



Under chassis view showing the method of mounting the mechanical filter. Check for signal leaking around the filter by disconnecting one end and shorting the terminals. The speaker should be silent, even with full gain.

the side of the station in order to place one-half of the spectrum in the receiver bandpass. This, of course, removes the other sideband, making s.s.b. transmissions out of all a.m. stations. Using this system it was possible to eliminate heterodyne interference by tuning to the other side of the signal, thereby placing the heterodyne outside the receiver bandpass.

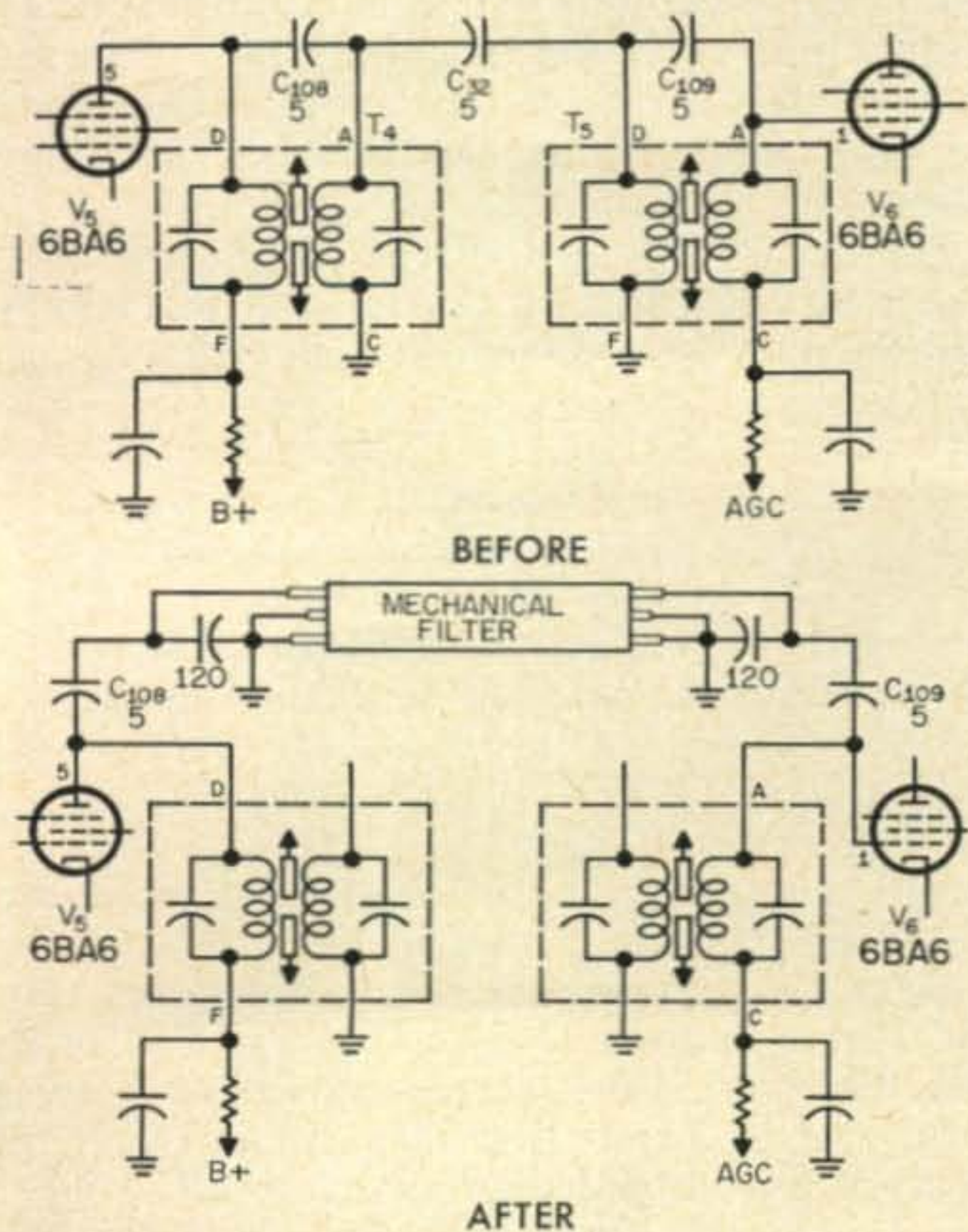


Fig. 1—Circuit modifications for adding a mechanical filter to the Collins 75A-2.

Product Detector Modifications

The next step in our conquest of the 75A-2 was to wire in the product detector circuit. Since Sam had no aspirations to operate n.b.f.m., it was decided to use the narrowband f.m. adapter socket, making it unnecessary to drill any holes in the chassis. A 6SN7 tube was selected since it is an octal type. The final circuit for the product detector is shown in fig. 2, along with the origi-

nal circuit for comparison. A three-lug terminal strip was mounted under the nut nearest the i.f. section and all connections except the filament were removed from the n.b.f.m. adapter socket. The filament connection is pin 7. The front lug

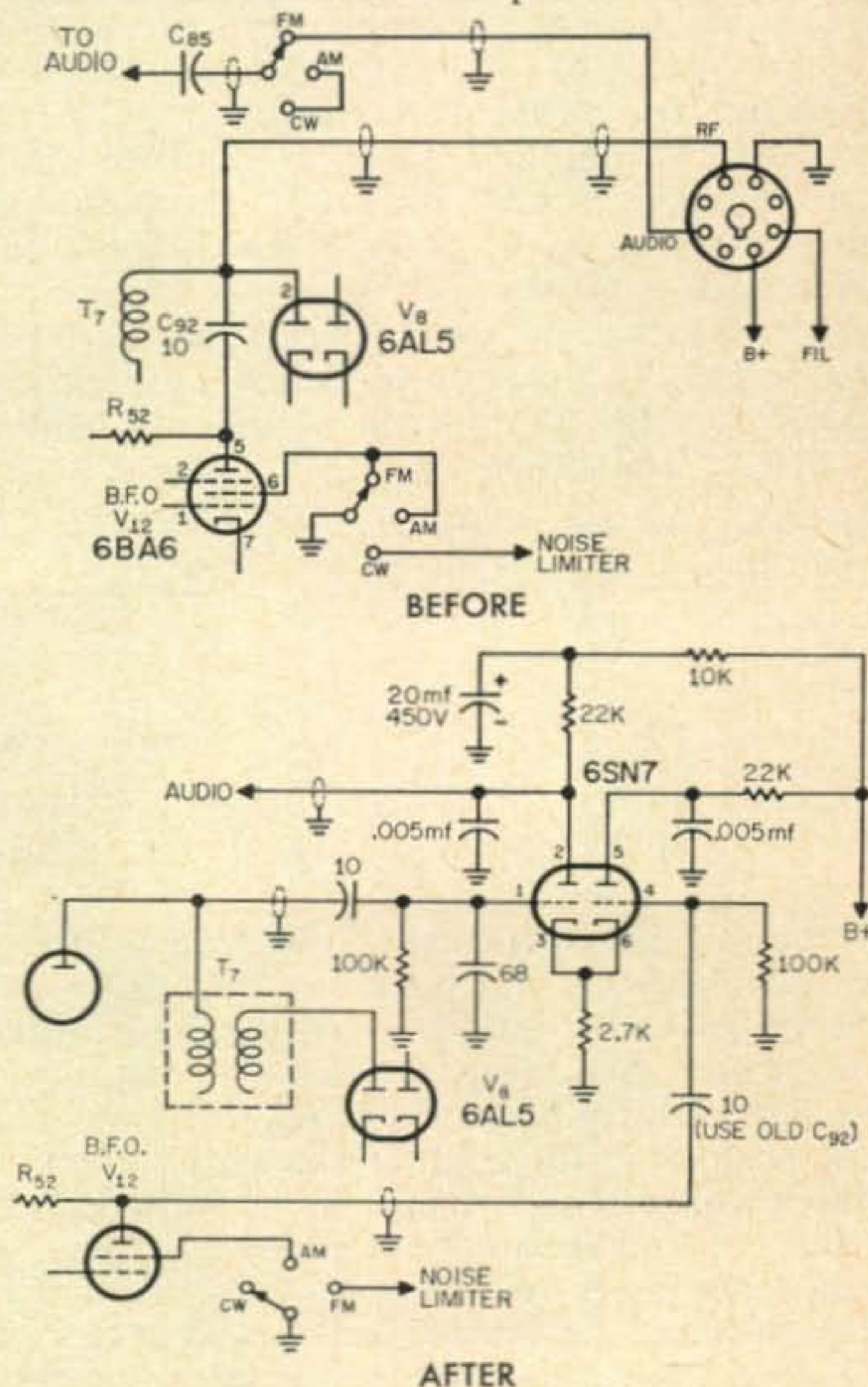
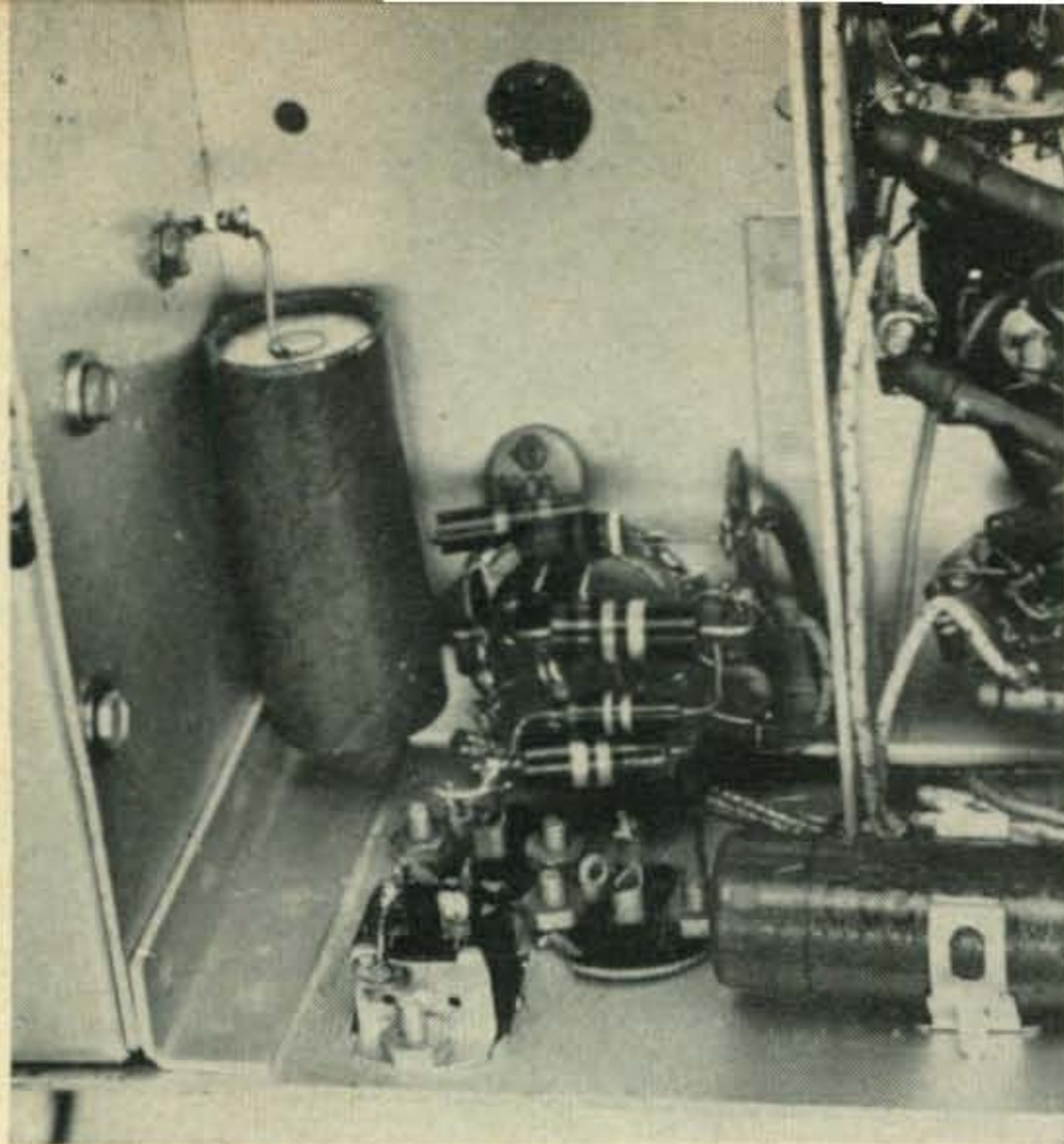


Fig. 2—Modifications to add a product detector to the 75A-2.

of the terminal strip connects to the plate, pin 5 of the b.f.o., tube (V_{12}) through a short length of coaxial cable (use the existing coax connected between the detector and n.b.f.m. socket. Capacitor C_{92} is removed and connected at the product detector end of the coax. The center



The product detector is mounted in the space behind the PTO unit. The connectors on the rear apron were the handiwork of a previous owner and have no bearing on the modifications described in the text.

lug of the terminal strip connects to B plus, originally pin 8 of the n.b.f.m. socket. The rear lug of the strip connects to the plate (pin 5) of the last i.f. amplifier through another short length of coax. Finally, the product detector circuit is wired as shown in fig. 2. To complete the conversion, clip the wire on the CW-AM-FM SWITCH which grounds the screen of the b.f.o. tube on f.m. This section of the switch is closest to the left edge of the chassis, directly behind the first i.f. transformer.

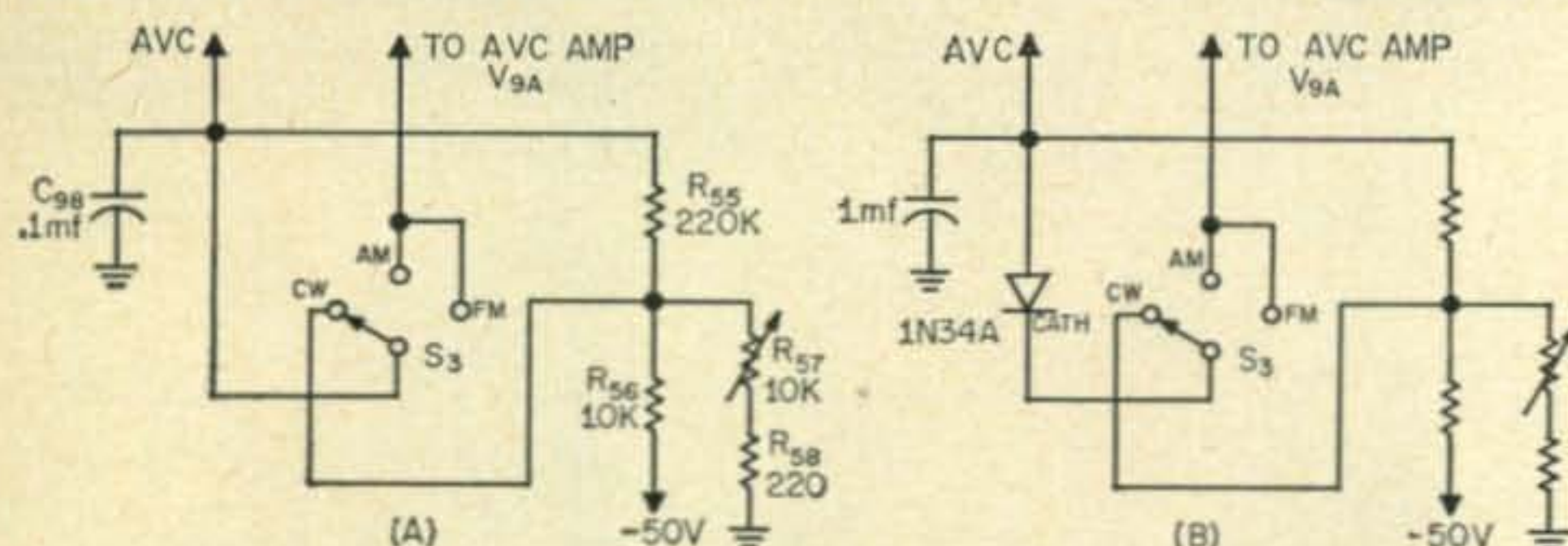


Fig. 3—Modifications to the a.g.c. circuit to eliminate pumping on strong signals. Note that C_{81} in the a.g.c. amplifier circuit must be removed to decrease attack time.

To check the operation of the product detector, switch to the FM position (now SSB) and tune in an s.s.b. station. Turn the b.f.o. pitch knob a little past the panel mark, in the clockwise direction for upper sideband reception. The same position in the counter-clockwise direction is the lower sideband. Once you have the station properly tuned in, pull out the b.f.o. tube, or temporarily short the screen grid to ground. The audio output from the speaker should drop considerably, indicating proper product detector operation.

AVC Improvement

I was just putting the last bolt in the cabinet, when Sam made an observation. "Listen to that 'thump' on s.s.b., every time someone says something". Sure enough, the a.v.c. took so long to build up, that the sudden inrush of r.f. would overload the receiver until the a.v.c. could catch

up. This produced a pronounced tail or "thump" at the beginning of each word. What was needed was an *agc* system which would charge up, or attack quickly, but decay or discharge slowly.

One solution to the problem is shown in fig. 3. A diode was connected in series with the a.v.c. line. When the negative a.v.c. voltage builds up, the diode cathode is more negative than the anode, and the diode conducts. Capacitor C_{98} charges quite rapidly due to the impedance of the a.g.c. line. When the s.s.b. operator pauses for a breath, the a.g.c. voltage on the diode cathode drops to zero, making the anode more negative than the cathode. This condition virtually opens the diode, and the charge on C_{98} slowly leaks off through the back resistance of the diode. Before the charge leaks off completely, the next burst of r.f. causes the diode to conduct and recharges the a.g.c. circuit.

Thus a station which is S9 will hold the meter between S6 and S9 (depending on how fast he talks, and the time constant of the circuit) for his entire transmission. Then when he stands by for an S2 station, the a.g.c. voltage drops to a new low value and averages at that point for the weaker stations transmission. The improved a.g.c. circuit really shows its worth in a round table, for there is no need for constantly readjusting the volume or r.f. gain control. There is a slight thump at the beginning of a transmission (or after a long pause) but this is not objectionable compared to the constant "pumping" action with the original a.g.c. system.

The decay time of the a.g.c. voltage is determined by the capacity of C_{98} and the leakage resistance of the germanium diode. For best

results a diode with very high back resistance should be selected. This will allow the smallest value of C_{98} and provide the fastest attack time. The author used a 1N34A, retrieved from the junk box, and it was necessary to use 1 mf at C_{98} to obtain a sufficient decay time. Don't forget to remove capacitor C_{81} , as noted in fig. 3, or you won't be able to make the attack time fast enough.

Sam and I had just finished buttoning up the A-2 for the second time when his wife charged into the shack like Teddy Roosevelt heading up San Juan hill. Her dramatic entrance was followed by a 20 minute tirade about keeping Sam away from home so much of the time, interspersed with comment about my giving him ideas on spending all their hard earned money. As Sam, his wife, and the 75A-2 faded into the evening, I muttered "There ain't no justice". And you know what? There ain't! ■