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XTAL

for the

radio amateur

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ARE WE PREPARED?

The unfortunate conditions of flood recently experienced by Manitoba, and the splendid part played by amateur radio in the rendering of service to the harassed citizens of the disaster-seized territory, points up many things.

At once, we are brought to the grim realization that disaster, in one form or another, can strike close to home no matter where we live. Concurrently with Manitoba, there were death-dealing fires in two sections of Quebec. It is a matter of record in Canada that we have experienced extensive and unbelievable suffering and damage from flood, wind and fire. Communication systems, on occasion, have been rendered temporarily inoperative.

The suffering and confusion of those in the centre of danger and loss is heightened by the separation of immediate members of the family whose safety is a matter of hope and conjecture. With communication isolation, the suffering becomes more acute.

Being made deeply aware of that fact from our experiences, or from the experiences of others, we are left with the conviction and understanding that our hobby is essentially one of communication capable of rendering to the public a service of inestimable value when normal means of communication, for the time being, have been disrupted.

Each year, it becomes ever more apparent to the thinking amateur that there is something in the nature of an obligation requiring him to maintain more than an efficient fixed station solely for the purpose of extracting pleasure from his participation in amateur radio. Each year, he is led to a better understanding of the fact that his licence places in his hands a public service potential which the vast majority of our citizens do not possess and which, if he prepares himself, can be, in circumstances, one of the greatest assets of his community.

Many a motorist carries a fire extinguisher in his care for use in emergency. Primarily, it is there to meet any fire situation that might develop in the car of the motorist. Nevertheless, he will not let the car of another motorist burn to a cinder simply because the other fellow is without a fire extinguisher. Our handy little piece of fire-fighting apparatus is a service-rendering agency which we bring into play, for the other fellow's benefit, just as quickly as we can remove it from its holder.

Man's usefulness to his fellow man in times of emergency is something to which we all automatically respond when the need presents itself. Unfortunately, many amateurs, and this writer is one, have failed utterly to foresee the possibility of emergency, and have done absolutely nothing to prepare for the rendering of public service through the use of our hobby and equipment if and when the need arises. Perhaps we have felt that "it can't happen here."

The motorist who would refrain from using his fire extinguisher because the fire was not in his own car would be a poor citizen indeed. It might be well for amateurs to ask themselves if they are pursuing their citizen obligation to the limit when, as licence holders, and as participants in a communication hobby, they fail to provide themselves with the equipment that will enable them to render the utmost public service when, for the time being, power mains and communication systems are rendered useless.

The man who dissipates his ability and qualifications is not contributing to his community the full measure of his usefulness of which he is personally capable because of his possessions. It may be that amateurs who fail to realize the public service potentiality of the hobby and who, consequently, have done nothing to place themselves in the position where they could render that service — it may be that they are not contributing to the community, and its reserve potentialities for public good, a full measure of that of which they are capable by virtue of the basic nature of our hobby — communication.

The Emergency Corps activities sponsored by A.R.R.L., and the annual Field Day under the same auspices, are serious and invaluable phases of amateur radio that invite and challenge us in the public cause.

NBFM ADAPTER

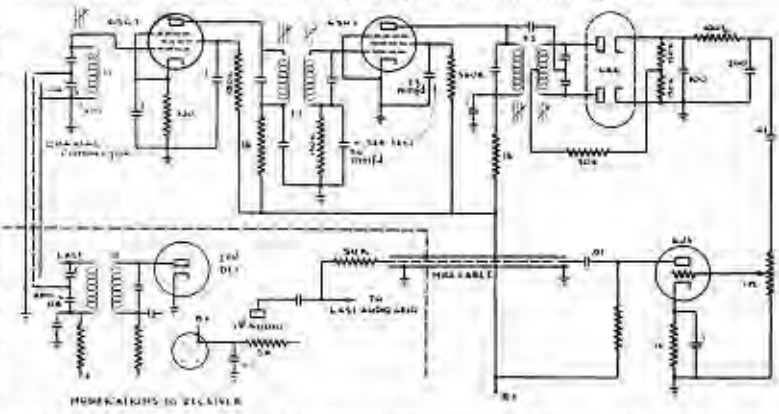
By H. J. Durant, VE3YF

THE ADVANTAGES of NBFM transmission have been extolled repeatedly in ham radio journals, and the economy of that method of modulation recommends it to many hams. However, the reception of this type of signal requires at least some effort at modification at the receiving end. To attempt to receive in a proper manner and to give quality reports from an AM receiver seems to be almost as unfair a comparison as reporting CW signals from a receiver lacking a BFO.

Numerous experiments have been conducted by the writer, using ratio detectors, the Travis circuit and the Foster-Seeley circuit. Results indicate that the Foster-Seeley circuit utilizing a limiter stage produces the best operation available to hams with the usual amateur test equipment for alignment.

The heart of an FM receiver is the limiter circuit. If the input to the limiter does not reach the threshold of limiting, it cannot function. It is essential that the IF signal be boosted by an additional IF amplification stage before comparable results can be expected from your AM receiver.

In the design of the adapter herein described the foregoing points were kept in mind, as well as the development of an adapter circuit which would require the smallest number of changes to an AM receiver, changes which will not interfere in any way with the reception of AM signals, nor lower the resale value of the AM set.



The following changes are recommended for the receiver, not only for use with this FM adapter but for experiments with Q5'rs, SSSB and other adapters. The last IF transformer is removed and a .06 mmfd condenser is connected in series with the tuning condenser already in the primary circuit. A lead from the junction of these condensers is brought out through coaxial lead to a microphone connector on the back apron of the chassis, providing an IF output of low impedance which can be used to feed any adapter requiring signal at intermediate frequency, and which does not interfere with the operation of the receiver in the use for which it was designed.

Another change is made in the audio circuit, whereby the output of any of the adapters previously mentioned may be connected through a phone jack to the grid of the output stage of the receiver through a 50K ohm resistor.

If power for adapters should be required to be supplied by the receiver power pack, a tube socket or similar outlet should be installed in the back of the receiver chassis. The positive high voltage lead should be decoupled by a series 5K ohm resistor and .01 condenser on the socket end.

The actual adapter consists of an IF stage, limiter stage, discriminator, and an audio stage with gain control and grid circuit.

Referring to diagram, T1 is an IF transformer of a frequency to match the IF of the receiver. The primary is removed, and a condenser (.06) is placed in series with the tuning condenser of the secondary, the junction being the input of the adapter taken from the output of the receiver IF as previously described. The following tube and IF transformer is conventional, with no modification required. Now we reach the grid circuit of the limiter. The value of the grid return condenser is extremely critical, and must not exceed 56 mmfd. The lowest capacity permitted with stable operation is the optimum value. In the unit described 56 mmfd was the value determined by experiment. Similar conditions hold for the screen bypass condenser, which in this case is 22 mmfd, value determined by the same methods as in the grid circuit. The values indicated are suggested as starting points, and may vary with different layouts.

In the discriminator circuit, the single condenser across the cathodes is unusual, but adequate for the purpose therefor. The low-pass filter on the output of the discriminator (100K resistor and 200 mmfd condenser), as recommended by manufacturer of the transformer, was found to give a more pleasing effect to the signal.

A conventional audio stage is included in the adapter for convenience of operation and to minimize changes in the receiver.

The unit is built on a chassis 4 x 8 x 2, with room left over for squelch circuit as described in November 1947 QST. Starting at the rear input corner, place T1, IF amplifier tube, T2, limiter tube, then across the front and returning toward the rear with discriminator transformer, discriminator tube, audio tube and space for squelch tube. The audio gain control is symmetrically placed on the front apron of the chassis. The power, IF input and audio output cables are

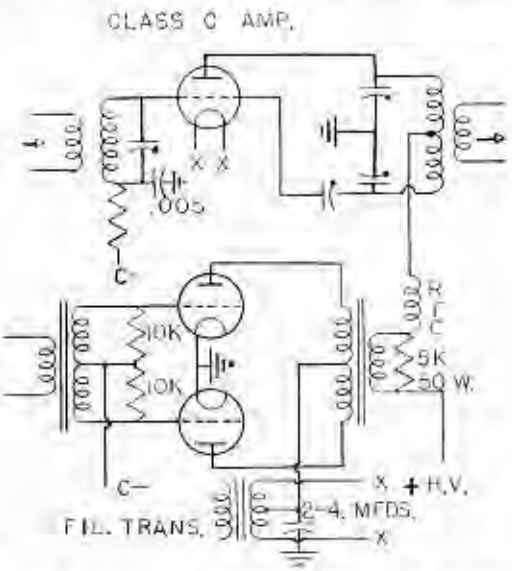
(Concluded on next page)

CONTROLLED CARRIER

The circuit herewith was seen in an English radio handbook, and I am informed it was also in January 1935 QST.

The Class C final stage is the usual design but the Class B modulator secondary is resistance-loaded, since the load will now be a variable impedance. The filament return (or cathode return) of the final Class C is lifted from the power supply negative return and in turn becomes the plate supply of the Class B stage. Thus the Class B stage becomes the control-stage.

The final plate current with no-signal will be lower than usual, since the entire supply



voltage is dissipated through the Class C and Class B stages. The Class B bias voltage to the grids determines the no-signal Class C current. This bias should be set to allow the Class C stage to draw only 10% of its normal amount. The filament by-pass value of the Class C will have to be HV types and the filter condenser about 2-4 mfds for normal type of voice characteristics.

The effect of controlled carrier finals is to lower heterodyne QRM, use less resting Class C current, provide a narrower signal, and almost zero BCI. This circuit was passed to VE7ALT and is now in use by him at Dawson Creek, B.C. His reports show the above to hold good in practice. The only disadvantage is that the receiver AVC should be off, sensitivity lowered and AF run well up. The slight time-lag is the characteristic of CC transmission and the only feature against it that the writer can see.

— VE7US, Penticton, B.C.

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R. Macdonald, VE3APS, and T. Powell, VE3ZE, have placed letters of resignation from their offices in CAROA with the executive committee.

NBFM ADAPTER

(Continued from page 5)

spaced equally across the rear apron of the chassis.

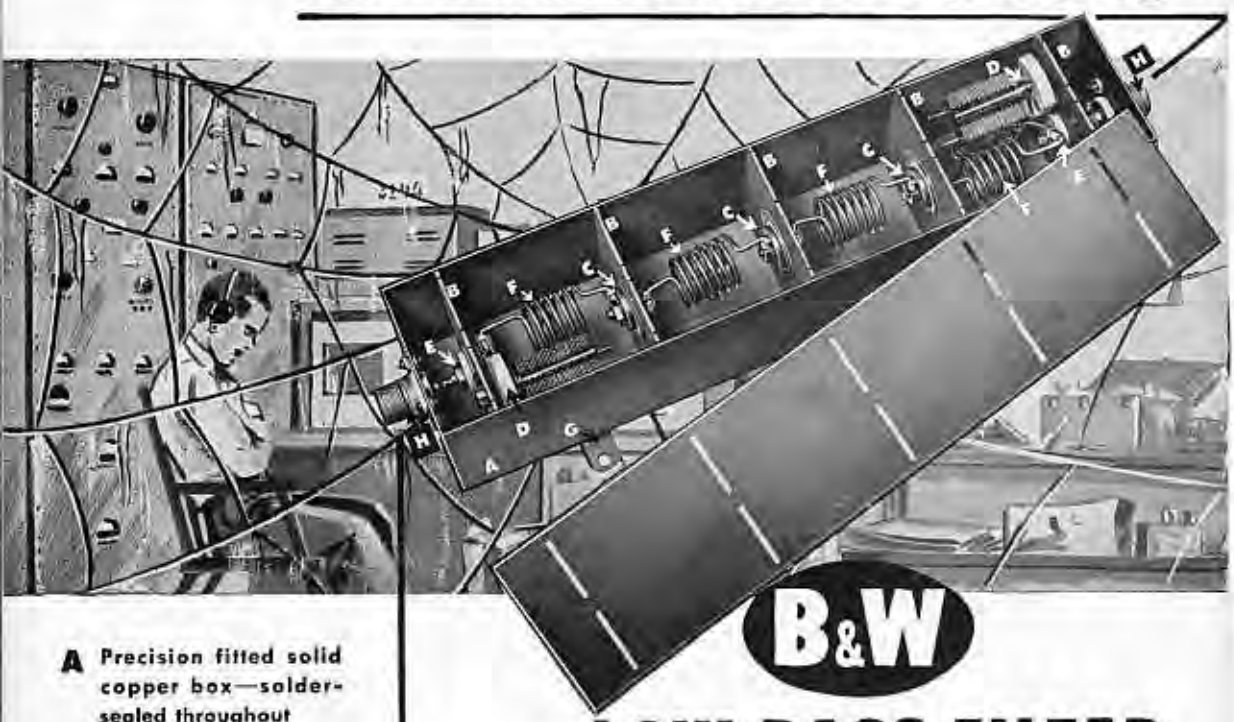
A simplified method of alignment is to tune in a local modulated signal using the shortest antenna possible. Back off the audio gain of the AM receiver and advance the audio gain of the FM adapter. With the secondary of the discriminator transformer detuned, adjust the input transformer (T1), both circuits of the IF transformer (T2), and the primary of the discriminator transformer (T3) for maximum signal. Then adjust slug in the secondary of discriminator transformer for minimum signal.

More accurate alignment may be obtained by those having access to an oscilloscope or vacuum-tube voltmeter by methods described in current periodicals.

When this adapter is in service, tune in a signal on the receiver. If it is NBFM, turn down the audio gain on the receiver and advance the gain on the adapter. Then you hear real FM. For a real surprise, both for you and the transmitting ham, have him reduce deviation to the lowest possible degree. Return the receiver to its AM setting, and you hear a carrier. Now go the FM position, and he is loud and clear. Good way to reduce QRM, hm-m-m-m?

LET'S LICK TVI

and brush the cobwebs off the rig



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