THE HOW AND WHY OF FILTERS— (Continued from page seven)

By changing the setting of the dial the capacitors vary, thus the band is moved up and down. The spectra of broadcast station frequencies and a station is received when the selector or filter is adjusted to pass the particular frequency of that station. So when just glancing at a wiring diagram of a receiver, you see a number of choke coils and condensers that apparently seem unnecessary. Remember that they are valuable components of the scheme as a whole to make for better Radio reception and should not be slighted.

RADIO WITH THE COLORS— (Continued from page nine)

The general Radio equipment of the Coast Guard is very similar to that of the Navy except that the Coast Guard uses a telephone to a greater extent. The value of Radio to this organization may be more apparent when we consider that the boats are transmitting 85% of the time.

These various government departments, through their recruiting stations in all large cities, are constantly on the lookout for trained Radio men.

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Maynard A. Carlson, Joliet, Ill., says: “In placing unmarked power transformers here is how I find the various windings. Use a simple continuity meter, a battery and voltmeter. Locate all leads across which a reading is obtained. Separate leads into groups and mark them. Put a 25 watt bulb in series with your A.C. line (none of the leads on the transformer should touch each other). Put your A.C. and series bulb across each pair of wires which show continuity. On filament windings you have bright light, on the high voltage, no light, on primary, a faint glow. Test each winding with an A.C. meter to determine the various voltage outputs.
NO doubt things have been a bit slack. Business was "off color" and Radio felt the effect just like other industries.

But I think Radio was in a different position, call it depression if you will—but one from which it is easier to emerge.

Radio is an infant. Commericially it is only twelve years old. Like a long-legged boy, it has grown rapidly and attained an enormous height. It must have a period of adjustment to spread—to become a broader.

Almost daily new jobs are found for this young man Radio. As he emerges from this adjustment, he gets into Television, Aircraft, deeper in Short Wave and Sound and many new developments.

In 1926, the year of Radio's commercial birth, only one-half million dollars was spent on him. Today, he is near the billion dollar class.

Radio is popular with the public which is demanding better reception sets—better service—better broadcasting facilities. Its industrial applications are time and labor saving devices that will be indispensable.

From nothing to a billion dollars in twelve years is indicative of Radio's earning power for his followers. Who can predict just where Radio will be five—ten years from now?

N. R. 1 has introduced you to this young fellow who has been mighty kind in financial way to those who've known him. The better you know him, the more profitable will be your acquaintance.

Page two

THE HOW and WHY of FILTERS

By J. A. DOWIE, Chief Instructor

Because of the general misunderstanding which seems to exist among some Radio students in regard to the subject of filters, the writer will endeavor to explain in a simple way the purpose and action of filters in radio circuits.

It seems that, when referring to the word "filter" to a radio service man, he probably four times out of five he will draw a mental picture of the power pack of a radio set in mind. In other words, the word "filter" is invariably associated with the power pack. The Radio service man is not altogether to blame for this as a good many of us have been "brought up" to think of the power pack filter as being the only filter of any importance employed in the modern radio set.

But in reality filters are found in several more places than just in the power system of a receiver of today, and while the design and construction of some filters covers quite an extensive field in itself, and its mathematical aspects would be of very little value to the average service man, unless he be so beware of the study of this very interesting branch of electrical design, yet a brief discussion of filters in general should be of interest and some value to him.

ACTION OF FILTERS

In chemistry a filter is a sheet of paper or a piece of absorbent cotton in a glass funnel, for the purpose of letting through a liquid and stopping solids. In ventilating engineering, a filter is a device that will pass air and stop solid matter.

The purpose of a filter in a Radio and electrical engineering is not very different from that in chemistry; it is simply a combination of coils of wire and condensers used for separating several things which are mixed together. In this case they deal with electric currents of different characteristics: that is, direct and alternating currents, or alternating currents of different frequencies. Their action depends on several well-known facts: first, that an inductance permits the passage of direct currents and low-frequency currents with much less opposition than it offers to high-frequency currents; second, that a condenser will pass high-frequency currents more readily than lower frequency, while it stops or "blocks" the flow of direct current; and third, that tuned circuits will permit the passage of alternating currents in a narrow band of frequencies and will oppose the flow of currents at other frequencies, or vice versa. By a proper arrangement of coils, having air and iron cores, and condensers of different capacities, any desired filtering action can be obtained.

TYPES OF FILTERS

Filters may be divided in four principal types as follows: Low-pass filters, high-pass filters, band-pass filters and band elimination filters. The purpose of each will be explained by the aid of Fig. 1.

Low-pass filters prevent currents of a frequency higher than a certain predetein value from passing. This type of filter will pass direct current and all alternating currents of a frequency lower than the critical value mentioned above.

The high-pass filter will pass all currents of a frequency higher than a certain value. In most cases a filter of this type will stop the flow of direct current as well as that of low-frequency alternating current.

Figure 1

Page three
A Chat With the

N. R. I. Director

REGARDLESS of how other industries may have suffered during the recent business depression, Radio broadcasting as a business, seems to be going forward at a rapid rate.

The gross income from the sale of time by the two major broadcasting networks amounted to $17,399,720 during the first half of 1931 while for the same period in 1930 the gross revenue was nearly $5,000,000 less, to be exact, $12,689,650.

I'm going to get away from arguments in the abstract about Radio opportunities and talk about actual cases. Every N. R. I. man is interested in knowing where other fellows found opportunity.

If we'd travel half way round the globe, to the Royal Observatory at Kowloon, Hong Kong, China, in the Radio Receiving Station we would find N. R. I. graduate Han Pen Juan—doing a good job the N. R. I. way.

And up in Iceland, at the Government Radio Station, another graduate is at the controls.

Information has been received that Graduate Kermit Hanson is with the Paramount Sound News Company, on duty in Europe.
This is called a two unit filter combined in one, where $C_1$ is common to both units. The first unit eliminates a certain percentage of the ripple, depending upon the values of $C_1$ and $L_1$, and the second unit eliminates a similar percentage of the residual hum. The chief function of $C_2$ is to regulate the voltage of $C_1$ to suppress the ripple and $C_2$ to store energy to take care of fluctuations in voltage demand from the receiver.

This is the “filter” so commonly known to Radio service men.

A high-pass filter unit is shown in Fig. 3(a). The inductance coil allows comparatively free flow of low frequencies through it while offering great opposition to high frequencies the condenser on the other hand passes currents of high frequencies much easier than currents of low frequency. It will be noticed that the only difference between the low-pass and the high-pass filters is in the arrangement of apparatus in the circuit.

In Fig. 3(b) we have a band-pass filter circuit; the coil $L_2$ and condenser $C_2$ are in series; the inductance and capacity of these are selected so that they will resonate at the frequency to be passed through the circuit; the resistance of these will be high at all other frequencies. The coil $L_2$ and condenser $C_2$ in parallel with each other is the by-pass unit. It is selected so that it will offer the greatest possible opposition to the flow of current at the resonant frequency.

Consequently this resonance frequency is rejected by this parallel circuit and is forced on through the circuit. All other frequencies going back to the source through this by-pass arrangement which offers opposition to frequencies other than the desired resonant frequency which is to be passed.

In Fig. 3(c) the band-exclusion type of filter is shown. The coil $L_3$ and the condenser $C_3$, is used to prevent the passage of

Figure 2 shows a typical low-pass filter. This as you can see is simply a combination of choke coils and by-pass condensers arranged and so designed that the higher frequencies present in the raw rectified alternating current from the rectifier tube are filtered out before being used as plate current on the various vacuum tubes in the receiver.
Radio With the Colors

National Radio News wishes to thank Major C. W. Lewis and Captain Frank E. Stoner, U. S. Army, and Lieutenant-Commander E. M. Webster, U. S. Coast Guard, for their assistance in the preparation of this article.—Editor.

Government in connection with Radio. Visiting the Message Center of the War Department Radio offices in Washington, one is surprised at the ease and dispatch with which messages are received and transmitted to the Army's outposts in the four corners of the globe. Here sits an operator in contact with Hawaii—there is one conversing with the Panama Canal.

Official figures show that in the various branches of U. S. Army communication work there are between 7,000 and 8,000 men. The Army maintains a Radio school for training men, specifically in the Army procedure at Fort Monmouth, New Jersey.

While by the very nature of their work, the U. S. Marines are very closely allied with the Navy, they maintain their own communication operations and have about 500 men engaged in this work. They maintain a Radio school at the Marine Barracks, Quantico, Virginia.

Unless one is present to see the activities, it is difficult to imagine the tremendous part Radio plays in the Navy. Headquarters in Washington can be in touch on a moment's notice with any of its far-flung stations, fleet commanders or individual ships. Ships are in constant touch with the weather and the news of the world by means of Radio communication.

Probably the most interesting of all Radio communication is the intra-fleet work by which the Admiral of that fleet, acting upon orders from the Bureau of Navigation, directs the maneuvers of any number of great ships day or night, regardless of weather conditions.

Fleets generally operate with a completely equipped hospital ship in attendance but where small Navy units operate independently, they may be out of touch with these floating hospitals. Illness or injury may have overtaken one of the crew. A Radio message is sent to the nearest point of medical relief and arrangements made for speedy transportation to that point by plane, or by the fast Navy destroyers. Cases are on record where merchant sailors, on ships having no hospital facilities, have by Radio, located the position of Navy ships equipped for medical work and through the cooperation of the commanding officers, lives have been saved.

The U. S. Navy operates two schools for Radio men, one at San Diego, California, and the other at Hampton Roads, Virginia.

A branch of our Government which does not enjoy near the publicity it deserves is the U. S. Coast Guard.

Its work is not primarily military, although its chief duties rest in the protection of rights and property along our coast.

The very nature of their operations is such that their efficiency would be greatly reduced were it not for Radio as a means of rapid and efficient communication. Approximately 500 men comprise the Radio staff of the Coast Guard.

They operate from key stations at Boston, New York, Mobile, Seattle and San Francisco. The shipping of the world is benefitted.

(Appears on page 16, please)
THE STORY OF GRADUATE
HARRY EICHLER

In our time we’ve seen a lot of men become successful. We’ve seen many of them climb from an earning capacity of practically nothing up to financial independence.

Many overcome difficulties — walked roughshod over what appeared to be insurmountable obstacles to reach their goal.

Such is the case of Harry Eichler, the German boy who came to America in 1928.

Although equipped with a fine education Eichler found it difficult to get a job other than as a gardener at $24 a week.

In June, 1928, he started on his rise to success — he enrolled with N. R. I.

Regular working hours were long. His determination to succeed frequently caused him to study and work on Radio experiments until far into the morning. But what does this matter to a man who has visions of success — a man who will not admit failure?

From the very first Eichler has never stepped backwards in his earnings. As he started making money as a result of his Radio training his income increased from $24 a week step by step to $30-$35-$40-$50, not including spare time work.

Just as things seemed to be breaking nicely, with friend Harry on the highroad to success, came the crash. He was unfortunate enough to have his car struck by an express train. The result, $1,500 doctor and hospital expenses.

But did this put him down? — did he fall by the wayside? — admit defeat? Not on your life!

Page ten

Dear Editor:

I beg to be the complaint from "Our friend from Washington."

Where there’s one who takes the trouble to write his complaint there are thousands who do not write in to express their approval.

The delighted air their views while the contents maintain silence.

By all means preserve the "human interest" element.

There’s something of interest for everyone while everyone contributes to the News.

CHAS. W. DUBOSS, Detroit, Mich.

Page eleven

RADIO-TRICIAN SERVICE SHEET

MAJESTIC SERIES 60 — MODELS 61, 62 AND 163
COLOR CODE

Power Transformer

Primary

Start of Winding — Red

115 volts — Red and White

125 volts — Yellow

Filament — Green

145 Blue

Heater — White — (135 v. above ground)

Heater — White — (135 v. above ground)

FILTER UNIT

2 microfarad condenser — Green

1 microfarad condenser — Yellow

2 microfarad condenser — Blue

Filter Output — Red

Detector Chokes Low Side — Green

CHOKES

Junction of Chokes — Blue

Voltage Table of Majestic Series 60

<table>
<thead>
<tr>
<th>Position</th>
<th>Tube</th>
<th>Fill. Volts</th>
<th>Plate Volts</th>
<th>Grid Volts</th>
<th>Screen Grid Volts</th>
<th>Cathode Volts</th>
<th>Normal Plate M.A.</th>
<th>Per Plate</th>
</tr>
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<tbody>
<tr>
<td>1st R. F.</td>
<td>G-51</td>
<td>2.35</td>
<td>285</td>
<td>215</td>
<td>3</td>
<td>4.5</td>
<td>300</td>
<td>0.08</td>
</tr>
<tr>
<td>Oscillator</td>
<td>G-27</td>
<td>2.35</td>
<td>135</td>
<td>215</td>
<td>3</td>
<td>4.5</td>
<td>300</td>
<td>0.08</td>
</tr>
<tr>
<td>1st Det.</td>
<td>G-51</td>
<td>2.35</td>
<td>285</td>
<td>215</td>
<td>3</td>
<td>4.5</td>
<td>300</td>
<td>0.08</td>
</tr>
<tr>
<td>2nd Det.</td>
<td>G-51</td>
<td>2.35</td>
<td>275</td>
<td>135</td>
<td>12</td>
<td>25</td>
<td>300</td>
<td>0.08</td>
</tr>
<tr>
<td>1st A. F.</td>
<td>G-45</td>
<td>2.4</td>
<td>300</td>
<td>50</td>
<td>32.5</td>
<td>32.5</td>
<td>300</td>
<td>0.08</td>
</tr>
<tr>
<td>2nd A. F.</td>
<td>G-45</td>
<td>2.4</td>
<td>300</td>
<td>50</td>
<td>32.5</td>
<td>32.5</td>
<td>300</td>
<td>0.08</td>
</tr>
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Note: All plate, screen grid, control, and cathode voltages are measured from Ground (Chassis) with a standard 1,000 ohm per volt voltmeter. Voltages shown in above table with voltmeter control at maximum position. Voltmeter readings of the automatic volume control tube plate terminal will be erratic because of the 750,000 ohm resistor which is in series with the plate supply leads.

TECHNICAL DATA FOR
MODEL 160 MAJESTIC RADIO PHONOGRAPH CHASSIS

The radio circuit and performance of the Model 163 Radio-Phonograph Combination is identical with that of the Model 60 chassis.

The phone panel controls of the Model 163 combination are radio controls only, and are the same as that of the Model 61 and 62 radio receivers.

The phonograph side of the Model 163 combination consists of a pick-up, pick-up transformer, phonograph volume control, phone-radio switch and motor board assembly.

The second detector tube grid comprises the audio frequency input circuit when the phone-radio switch is in the phonograph position. The second detector tube however in an audio frequency amplifier when the receiver is switched to the phonograph position, the grid bias and input circuit of this tube being changed accordingly.

The phonograph volume control is separate from the radio volume control and is located alongside the turntable on the motor board as is the phone-radio switch.
Alumni Association

Election Returns

The confidence of the Alumni Association members in its officers is gratifying to say the least. This confidence was proven by the results of the election just held to appoint a president, four vice presidents, a secretary, and a corresponding secretary.

In each case the same officer has been elected for another year to hold the same office as heretofore, with hardly a dissenting vote. In addition, as you already know, Mr. P. J. Murray of the N. R. I. Staff has been elected to the office of Corresponding Secretary.

The following are the officers for the coming year:

JOHN F. FRITZ, President.
WKZO, Berrien Springs, Mich.
HARRY BURBOKDO, Vice-President,
Adams, Mass.
ALFY BLAIRS, Vice-President,
Thurston Mine, Gordon, Canada.
HOYT MOORE, Vice-President,
3351 So. Larchmont Drive,
Indianapolis, Indiana.
DONALD LOOOG, Vice-President,
WIT, Charlotte, N. C.
EARL MERRIAM, Secretary,
1536 Yen St., N. W., Washington, D. C.
P. J. MURRAY, Corresponding Secretary,
1536 Yen St., N. W., Washington, D. C.

As National Radio News is now the official organ of the N. R. I. Alumni Association, your editor will work in close cooperation with the officers of the Association for the best interests of all members. And it is up to every member to assist the officers in the fine work they are doing in every way they possibly can. Your ideas and suggestions are always welcome and we are depending upon each and every individual member to assist in the membership increase of the Association.

(Page 14, please)

How I Sold Myself Into A Good Job

By K. W. GRIFFITH

(Member N. R. I. Alumni Association)

WHEN it became known that we were to have a new Radio station in our city I planned to secure the work of station construction.

Several other fellows, naturally, were also interested in getting the job and this brought into the picture quite an array of competition.

The various other men submitted to the station manager their claims and accomplishments, many of which were worthy and entitled to serious consideration. Some of the fellows even had "family" or "inside" connections which gave them a personal advantage that I as a comparative stranger did not possess.

However, I can't believe in letting a little thing like that lick me, and I had a reserve that I was holding back as a "trump card" to be used at the proper time—when the deciding day came. In other words I was holding back my best move until the last.

I bundled up a copy of "Rich Rewards in Radio," my lessons that Mr. Dowie had graded and returned, and several letters from Mr. Smith, Mr. Haas, and other members of the N. R. I. Staff. (I was not a graduate at this time.) When I secured an audience I
I SOLD MYSELF INTO A JOB
(Continued from page thirteen)

first showed by prospective employer "Rich
Rewards in Radio," going into some detail as to
what my school work was—what it meant to me
and what it meant to Radio. Then pros-
duced my lessons which had been returned
graded and I'm thankful that they were all in
the "nineties," and then my letters which showed
the Institute's interest in the progress of
its students and its desire to see them

I certainly did hit the nail on the head. Mr. Sharp (the manager) turned and said,
"I've heard a lot of this school before but
I had no idea that it was such a large and
thorough training organization. While I
Don't know how much you know about
Radio, I know a bit of what you're up to.
Mr. Sharp turned his attention to the

The rest of my story is short. The trans-
mission was built (by the help of my N. R. I. knowledge in the shop to N. R. I. text books) and put on the air in due time.
The manager left later and through promo-
tion I became student manager later. Working on
this job, I saw a graduate, I made $150 a month
before I was graduated. I was promoted to
Manager and I was paid a salary which
was not liberty to make public but suffice to say the price was
worth any man's efforts.

My "trump card" was my N. R. I. connec-
tion and I have had reason many times since
-s proved and thankful of this possession.

Since then the station has changed hands,
go into the hands of owners who had
their own complete staff of Radio men-so
I'm at the present time conducting my own
service business and I'm getting along

THIS MONTH'S COVER
shows graduate C. E. Weigal of Louisville.
Kentucky, starting out on a call to put a
set in top condition.
Graduate Weigal has found his opportu-
nity in Radio, bought his car with
Service profits and does a yearly busi-
ness of $150 a year. Weigal
Weigal is a plugger and don't let anyone
tell you otherwise.

THE MAILBAG

October

1932

The "Get-together"
Corner

Norton says it's O. K.

DEFOREST QUICK-HEATER TUBES
The De Forest Radio Company of Passaic,
N. J., announces that their "Quick-Heater"
tubes have been on the market one year now
and have lived up to the expectations. Aside
from quick-heating they state, their tubes
maintained an unusually low-hum level
throughout their entire service life.

ALUMNI ASSOCIATION ELECTION
RETURNS
(Continued from page thirteen)

Do not be satisfied that you yourself are
a member, if you have a friend who is also
an N. R. I. graduate and who has neglected
to keep up his membership—that is your
responsibility to get him in line. Remember,
the bigger we are the more powerful we will
be—there's strength in numbers.

Before we close this month's column, we
want to remind anyone interested

to check their mailboxes for the
"Mailbag." This month's issue is
on the way and should reach you any time now.

Wants Mail Bag

I read the item in the National Radio News about di-
combining the "Mailbag." Do not do this, I for one
am very much interested in what the other students
and graduates are doing and I am thankful for their service
suggestions that they submit.—C. W. Tew, Milwaukee, Wis.

Construction does not consist of everything done
at once, but in one stone being placed upon another.
—J. H. Brown.

Never, throughout our history, has a man who lived
a life of ease left a name worth remembering.—Theodore Roosevelt.