

The

FLASH!

The Newsletter of
The **Colorado Radio Collectors**
Antique Radio Club

Volume 33, Issue 2

Next meeting **March 13th, Littleton, 1PM**

March/April 2022

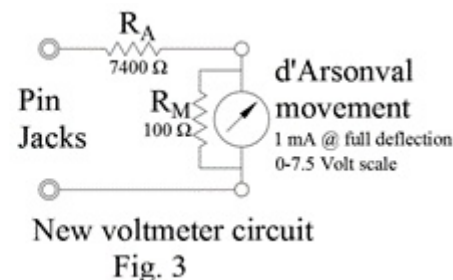
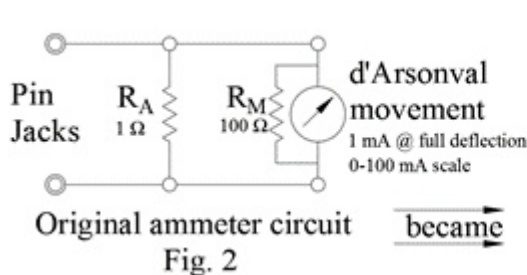
Past **Flash** Articles Re-visited...

In this issue of the Flash, we present the last in the series of three separate "*sequels*" to articles that appeared in past issues. *Editors.*

Meter Conversion: Part 2

by Larry Snyder, CRC member

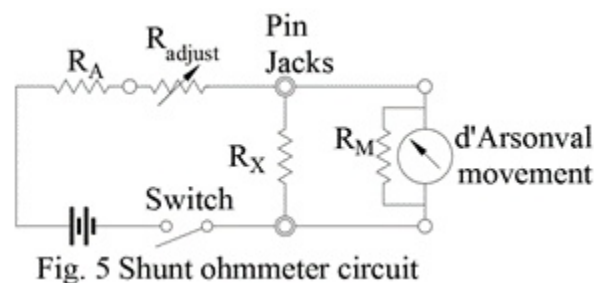
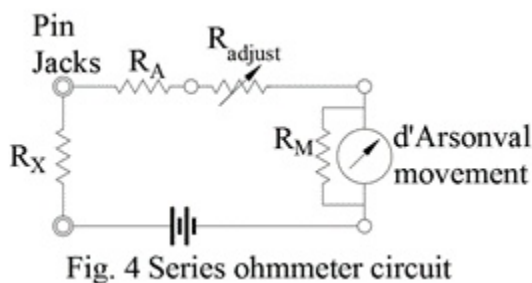
In the **March/April issue of the Flash, Vol. 31-2**, I presented how to convert an analog DC ammeter to a DC voltmeter. The ammeter used for the conversion in Vol. 31-2 was a d'Arsonval meter movement in parallel with a 1-ohm shunting resistor R_A , as shown in Fig. 2. The meter coil resistance R_M is 100 ohms and 1 mA current passing through the meter coil causes full-scale deflection. The meter scale was marked 0-100 mA.



In Fig. 3 the ammeter was converted to a voltmeter by removing the

shunt resistor and adding the 7400-ohm R_A resistor in series with the movement. The ammeter's scale was also changed to read 0 to 7.5 volts. In both the ammeter and voltmeter in should be noted that the R_A resistor limits the current through the movement's coil which determines the full-scale deflection of the meter pointer.

In this article I will discuss converting that very same DC voltmeter into two ohmmeter configurations: a series type ohmmeter (Fig. 4) and a shunt type



ohmmeter (Fig. 5). Both

ohmmeters require a battery to operate. To compensate for lower supply voltage as the battery ages, an ohmmeter circuit includes a variable resistor R_{adjust} to calibrate the ohm scale. When using ohmmeters, the electrical power in

continued on page 3



The Flash! © 2022, all rights reserved.



Newsletter for The **Colorado Radio Collectors** club, founded in the Fall of 1988.

"Dedicated to the preservation and education of wireless, antique radio, television and associated equipment."

CRC MEETINGS: Meetings are held on the 2nd Sunday of every other month starting in January (except May is the 3rd Sunday) at 1:00 pm. The meetings consist of business, "show & tell", raffles, auctions, swap meets, technical discussions and other subjects of interest. Visitors are welcome!!

CRC MEMBERSHIP: Current annual dues are \$20 and membership in the CRC runs from July to June. New memberships will be prorated to the following June. Members are entitled to attend meetings, participate in our Fall show and our Fall auction, and receive our newsletter, **The Flash!**. Submit dues payable to: **Merril Campbell - 4723 Woodbury Dr. - Colorado Springs, CO 80915**

UPCOMING EVENTS: **CRC Meeting - March 13th, Bemis Library, Littleton at 1 PM. See back page for map and directions. March 20th - Vintage Voltage Show. See page 5 for directions and link to a map. May 15th, CRC meeting. Location to be determined.**

CRC contact information.

President

Michael Cook 303-885-8034

mldcook@hotmail.com

Vice-President

Paul Heller 303-432-0434

phesopheon@comcast.net

Treasurer

Merril Campbell 719-596-3482

campbell321@juno.com

The Flash! Co-Editor's

Larry Snyder 303-279-9711

Lsnyder200@cs.com

Steve Touzalin 303-988-5394

stevetou@comcast.net

eGroup Administrator

Mike McCutcheon 303-343-2956

ColoradoRadioCollector@gmail.com

eGroup posting address:

colorado-radio-collectors@googlegroups.com

Website address:

<http://coloradoradiocollectors.com/CRC/>

Webmaster

Paul Heller 303-432-0434

phesopheon@comcast.net

MESSAGE FROM THE PRESIDENT

I'm writing this message at about 8AM on Feb. 22, 2022, or, 2/22/22, a day filled with all twos with an added bonus of falling on a Tuesday, the second day of the week. What will this day bring, certainly something memorable - where will I be at 2:22 p.m. - maybe celebrating today's rare palindrome day? *(Note that a palindrome, the number / letters are the same way both backward and forward, like today's date or words like racecar or Bob).*

Moving on... We're less than a month away from the **Vintage Voltage Show - March 20th**. There is still plenty of time to put the finishing touches on your award winning display(s). Remember that the specialty category this year is **"your favorite childhood radio"**. Also remember to save your lunch money over the next few weeks so you can make that special purchase in the Vintage Voltage sale area. This year we return to a familiar venue in Westminster; **Delta by Marriott, Northglenn (Formerly the Ramada Plaza), I-25 at 120th Ave**. Be there on Mar 20, the show starts at 10AM. As always Club members can be there ~8AM for setup.

Our next club meeting will be at the Littleton Library on March 13th so hopefully more club members can attend this more centrally located venue as a key discussion will center around final touches on the VV show. As always we anticipate a great raffle / give-a-way and show-n-tell items. **Note the 13th is time for a change too as we spring ahead to daylight savings time - so plan ahead.**

See you all in Littleton at 1 PM on Sun. March 13.

Mike Cook

(continued from page 1)

the circuit being tested must be turned off so only the ohmmeter battery produces current for deflecting the meter movement. The ohmmeter pointers in both types, will rotate from left to right regardless of the polarity of the leads because the polarity of the battery determines the direction of the current through the meter movement.

A **series** ohmmeter (Fig. 4) consists of a battery and d'Arsonval movement in series with resistors R_A , R_{adjust} and the unknown resistance R_X . The two resistors R_A and R_{adjust} limit the current in the movement's coil when the test leads contact each other, or measure zero resistance. If the pointer does not indicate zero ohms at full deflection, the R_{adjust} resistor can be varied, to move the pointer to zero. With this arrangement the pointer moves from left to right, and the scale reads maximum at the left and zero at the right. This type of scale is referred as a back-off scale, with ohms values increasing to the left as the pointer backs off from a full-scale deflection. See Fig. 6a.

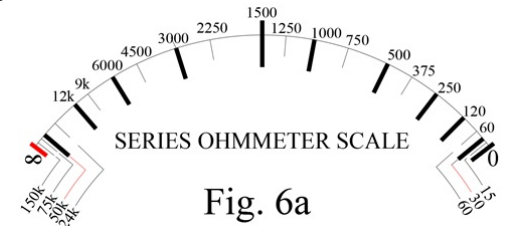


Fig. 6a

A **shunt** ohmmeter (Fig. 5) consists of a battery, a d'Arsonval movement in series with current limiting resistors R_A and R_{adjust} and a switch that prevents current from draining the battery when the meter is not in use. The two resistors R_A and R_{adjust} limit the current in the movement's coil when the test leads do not contact each other or measure an infinite resistance. If the pointer does not indicate maximum at full deflection, the R_{adjust} resistor can be varied, to move the pointer to maximum. The unknown resistance R_X is placed in parallel with the movement. Low values of R_X cause lower currents through the meter coil: high values of R_X cause higher meter currents. With this arrangement, the indicating pointer moves from left to right in the customary manner, but the scale reads zero at the left and maximum at the right. See Fig. 6b.

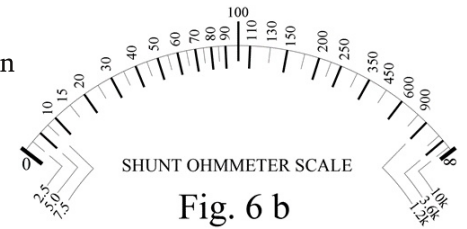


Fig. 6b

How to determine the resistance of the meter coil (R_M).

Never attempt to directly measure the resistance of a meter coil with an ohmmeter. To do so may result in a damaged meter, since the current required for the operation of some ohmmeters may be more than the full-scale current capability of the meter you may be checking. The recommended procedure is as follows.

1) Connect a suitable variable resistor R_1 and battery as in Fig 7a. Any voltage battery will do but be sure that R_1 has sufficiently high resistance to prevent pegging of the meter. Start with a high resistance and back down, as needed. Adjust resistor R_1 until full-scale deflection is obtained.

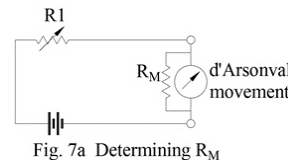


Fig. 7a Determining R_M

2) Then, as in Fig. 7b, connect a variable resistor R_2 in parallel with the meter and adjust R_2 until half-scale deflection is obtained.

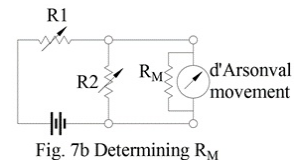


Fig. 7b Determining R_M

3) Disconnect R_2 and measure its resistance. The value of R_2 is equal to the resistance R_M of the meter.

Converting the voltmeter into a Series ohmmeter

Let us convert the voltmeter in Fig. 3 into a **series** ohmmeter as shown in Fig. 8. The meter coil has a resistance R_M of 100 ohms and 1 mA of current causes full-scale deflection of the pointer. Use Ohm's Law ($R_{\text{total}} = V/I$), to determine R_{total} when $R_X=0$ and the test leads are touching, and the meter is fully deflected. A 1.5v battery is used in the following calculations. You can use any battery voltage; only the calculated values will change.

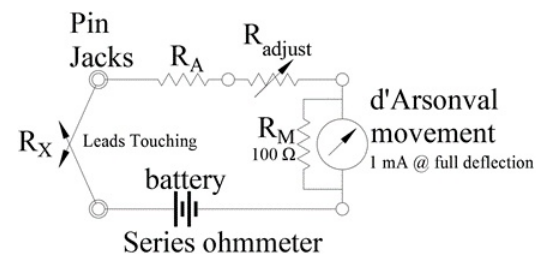


Fig. 8 Determining $R_A + R_{\text{adjust}}$

$R_{\text{total}} = R_X + R_A + R_{\text{adjust}} + R_M$ and is also equal to $1.5\text{v} / 0.001\text{A} = 1500$ ohms using Ohm's Law. With $R_X = 0$ and $R_M = 100$; the value of $R_A + R_{\text{adjust}}$

becomes 1400 ohms. I used 1200 ohm for R_A and a 0-500 adjustable resistor. A 0-2000 ohm adjustable resistor, set to 1400 ohms, is another suitable option.

When the unknown resistance R_X is equal in value to $R_A + R_{\text{adjust}} + R_M$, the ohmmeter will indicate half scale deflection. In this series ohmmeter, when a 1500-ohm resistor is placed between the test leads the current will be $\frac{1}{2}$ mA and the meter will deflect to half scale. The mid-scale point would be marked 1500 ohms. See Fig. 6a.

Converting the voltmeter into a Shunt ohmmeter

Let us convert the voltmeter in Fig. 3 into a shunt ohmmeter as shown in Fig. 9. The meter coil has a resistance R_M of 100 ohms and 1 mA of current will cause full-scale deflection of the pointer.

When the switch is closed, use Ohm's Law ($R = V/I$), to determine R_{total} when there is no R_X resistor, and the test leads are not touching, and the meter is fully deflected. A 1.5v battery is used in the following calculations. You can use any battery voltage; only the calculated values will change.

$R_{\text{total}} = R_A + R_{\text{adjust}} + R_M$ and is equal to $1.5\text{v} / 0.001\text{A} = 1500$ ohms.

With $R_M = 100$; the value of $R_A + R_{\text{adjust}}$ is 1400 ohms. I used 1200 ohms for R_A and a 0-500 adjustable resistor. A 0-2000-ohm adjustable resistor, set to 1400 ohms, is another suitable option.

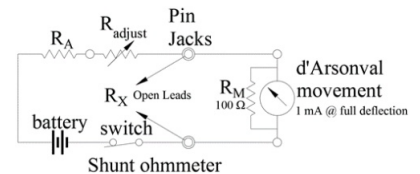


Fig. 9 Determining $R_A + R_{\text{adjust}}$

When the unknown resistance R_X is equal to R_M , the ohmmeter will indicate half-scale deflection. In this shunt ohmmeter, if a 100-ohm resistor is measured between the test leads, the current would be $\frac{1}{2}$ mA through the resistor and $\frac{1}{2}$ mA thru the meter coil, indicating half deflection. The mid-scale point on the shunt ohmmeter scale would be marked 100 ohms. See Fig. 6b.

To verify the theory and calculations, I made a test setup of the series and shunt ohmmeter circuits using the d'Arsonval movement of the meters shown in Figs. 2 & 3, with current limiting resistors removed.

The component values were measured with a digital multimeter: Battery voltage = 1.523 volts, $R_A = 1188$ ohms, $R_{\text{adjust}} = 102$ ohms, $R_M = 107$ ohms, $R_{\text{total}} = 1397$ ohms, The calculated current $I = V/R_{\text{total}} = 1.523/1397 = 1.09$ mA. The mid-scale deflections were verified when a 1500-ohm resistor was tested for the series ohmmeter, and a 100-ohm resistor was tested for the shunt ohmmeter.

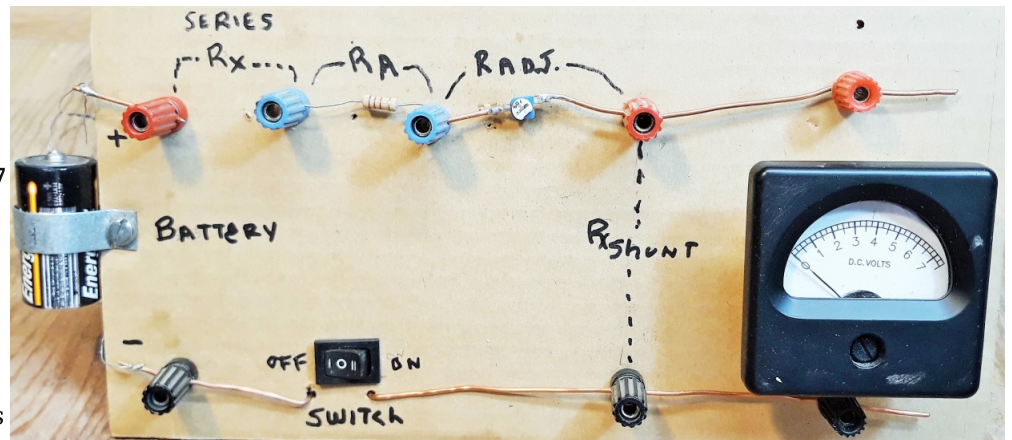


Fig. 10

Originally, I did not have the metal case on the meter, (See Fig 11). I was going to attach the new ohmmeter scale after I finished testing. This was a mistake. The surrounding metal case changes the magnetic field which moves the needle. When the metal case is removed the magnetic field is different, and incorrect readings are the result!

References:

- Hickey and Villines, Elements of Electronics, McGraw-Hill, 1955, pp 102-103
- Nilsson & Riedel, Electric Circuits, 7th ed., Pearson-Prentice Hall, 2005, pp 78-79
- Marcus & Marcus, Elements of Radio, 4th ed., Prentice Hall, 1959, pp 329-333
- Schultz, Grob's Basic Electronics, 11th ed., McGraw-Hill, 2011, Ch.8, pp 227-240
- Gerrish, Electricity and Electronics, Goodheart-Willcox, 1968, pp 156-157
- Cooke, Allied Electronics Data Handbook, 4th ed., Allied Radio Corp. 1963, pp 26
- Sams, Handbook of Electronic Tables and Formulas, 6th ed., Howard Sams & Co, 1989 pp 26-27



Fig. 11 Meter Case removed

Fig. 11

2022 Colorado Radio Collectors Annual Show

The **2022 CRC Annual Show** in conjunction with Vintage Voltage is on March 20th this year.

This has become a yearly event and we will again be a part of the Vintage Voltage Show. The show this year is at the Delta by Marriott, located at [I-25 at 120th Ave. \(Exit East\)](#).

Every year the turnout is tremendous with thousands of people going through the facility. This is your chance to show off your stuff. Bring your treasured radios and equipment to show everyone and see what others have brought. Although there will be a featured category, don't forget that all of the standard categories will still be available.

Every radio counts! Ribbons for top entries in each category as well as a **Best of Show** plaque will be awarded as a result of paired member judging. Take advantage of this opportunity to show off your stuff! We have yet to run out of space for the display of radios, so dig deep, bring some items and let's show off who we are!

CRC Show Schedule

Doors open/setup	8:00 AM
Registration	8:30 - 9:30
Judging Begins	10:00 (sharp!)

Judging Criteria

- **Exterior condition**
- **Interior condition (if visible)**
- **Presentation: display, documented, etc.**
- **Rareness: few are in existence**
- **Uniqueness: novel, not many like it**

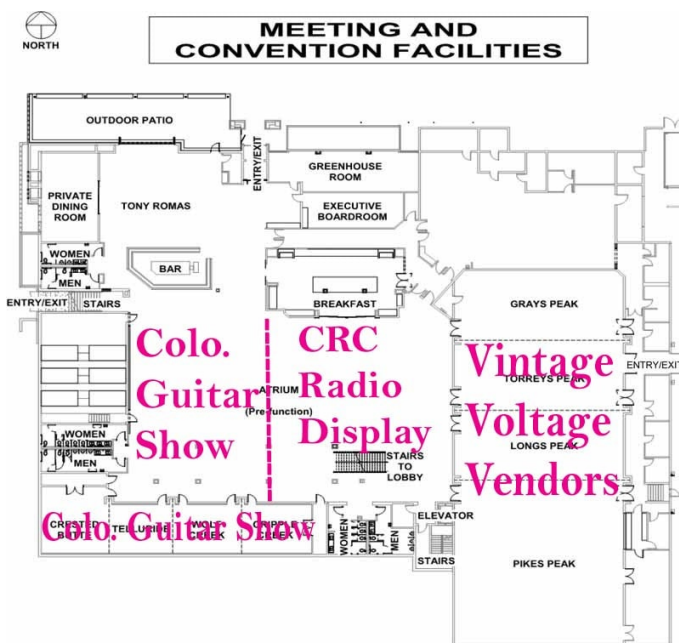
Note that these criteria are weighted, with an emphasis on condition and presentation, so everyone has a chance!

Be sure to place your display(s) in the correct areas designated by the display category signs. Be sure to go to the computer desk to check-in and get your entry tags.

Also, we depend on members to do the judging and also pass out the 'Peoples Choice' and other ballots - **please be available**.

Please use the enclosed form below to enter your items for the show.

For registration, email your information to: Paul Thompson at snowshoe9@comcast.net or Ralph Brands at rebrands@juno.com.



Pre-registration IS required !!!

2022 Colorado Radio Collectors Annual Show Entry Form

Contest Judging Categories:

Accessories
Bakelite
Battery (1926-1929)
Battery nonportable (1930+)
Catalin
Cathedral
Classic Audio
Communications Gear
Console (Fulllength)
Console (High/Low Boy)
Crystal Set
Homebrew
Kit

Metal Box (1920's)
Metal Case
Military
No Judging (Display only)
Novelty (Transistor)
Novelty (Tube)
Phonograph
Plastic (Tube)
Portable (Post 1938)
Portable (Pre 1939)
Pre 1926
Specialty
"My Favorite Radio"

Speakers
Telephony & Telegraph
Television
Test Equipment
Tombstone
Transistor
Tubes/Parts Display
Wooden (linepowered)

ADDITIONAL AWARDS
BEST OF SHOW
BEST RESTORATION
MOST EDUCATIONAL
PEOPLES CHOICE

2022 Colorado Radio Collectors and Annual Show Competition

March 20, 2022 at the Delta by Marriott - I-25 at 120th Ave. (Exit East)

The Specialty Category this year is: "My Favorite Radio"

Record your entries information on this form or in a similar format and email your info to snowshoe9@comcast.net or rebrands@juno.com

NAME

PHONE#

BRAND

MODEL/YEAR

CATEGORY

RESTORE

PROJECT? Y/N

1

2

3

4

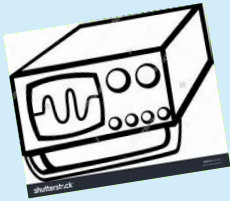
5

6

7

8

Use the backside of this sheet for additional entries if needed.



Classified Ads



Ads are free for CRC members. To place an ad send your ad description along with personal contact information to Steve at stevetou@comcast.net or Larry at Lsnyder200@cs.com.

REPAIR SERVICE: Radio repairs for club members. Reasonable rates. Good references.

Call David Boyle 303-681-3258

The insert shown below is from the August 1923 issue of **Radio-Age** and thanks to Bill Potorti for submitting the tidbit.

FOR SALE:

Starting to gradually sell off restored radios from my extensive collection to club members and friends. Prices are very reasonable and will gladly negotiate. Range from the early 1920's to mid 1950's. Mostly wood radios from the 1930's...my favorite styles!

David Boyle
Castle Rock Area
email: djboylesr@msn.com

FOR SALE:

Tube Radios - Tombstone, Cathedral and Novelty Transistor Radios.

I have collected radios of all types for 35 plus years and now it is time to let them go to new home/s. I have over 250 tube type and over 5,000 transistor (both novelty and shirt pocket type)

Please call 303-2381384

radios4us@aol.com

Thank You, Ron Smith

Radio Age:

A variety of devices for amplifying the sounds received through the receiving sets are now on the market for the choice of the owner of a radio receiving set, but if his means are limited, the ideas illustrated herewith may be applied at a total expenditure of less than a dollar.

The only material or hardware store. required is one or more small force cups, such as can be bought from any plumber or hardware store. Usually these cups are mounted on a wooden handle, as in A, Figure 1. The handle is removed as it is not used. Between the handle socket and the hemispherical cup there will be found a dividing wall of rubber, which must be cut out, as in B. The head set is fitted inside of these cups are then slipped over a T arm as in C, one of the arms being connected to the phonograph horn or other horn to be used. If only one receiver is used, no T arm is necessary, the cup being fastened right on to the tone arm of the phonograph.

GILBERT R. HEDRICK

Danvers, Ill.

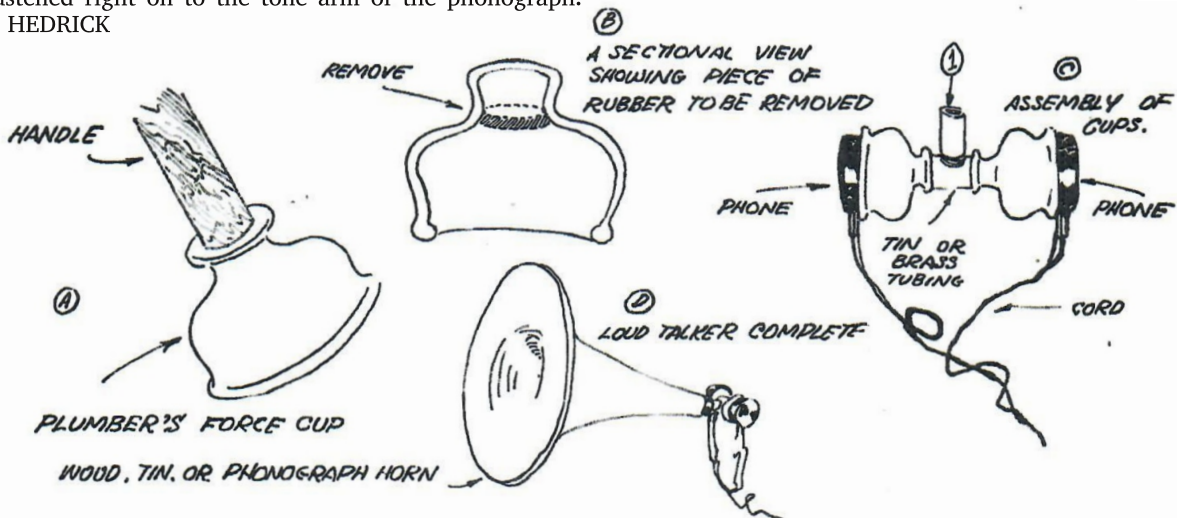


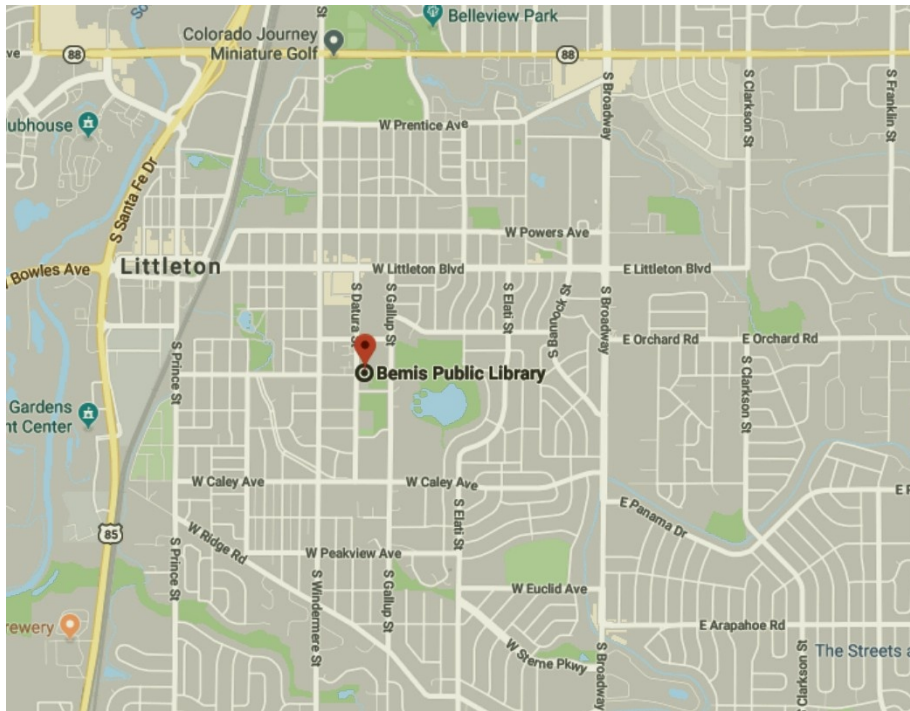
Figure 1. An inexpensive, easily constructed and novel loud talker can be constructed using parts obtainable in the average plumbing or hardware store.

SUBMISSION OF ARTICLES & AND ADVERTISEMENTS

Classified Ads and articles of any radio/electronic or historical related subject to be published in The Flash! are encouraged and welcomed. The article(s) should be submitted in **Microsoft Word, OpenOffice, RTF, or as plain text**, to Steve Touzalin by email at: stevetou@comcast.net or Larry Snyder at Lsnyder200@cs.com or by postal mail to 417 So. Queen Circle, Lakewood CO 80226. Formatting isn't necessary as it won't transfer into our software, but if you do, set the font to Times New Roman, size 10, left justified. If you have graphics (.jpg files) to be inserted, please name them and be specific about how you would like them placed. We will do our **best** based on space limitations.

CRC Meeting - March 13th at 1:00 PM at the Bemis Library in Littleton.

**Reminder: March 13th is also the start of Daylight Savings Time !
"Spring Forward"**



Directions to Bemis Library in Littleton

From Santa Fe and Bowles:
Head east through
downtown Littleton,
continue to Littleton Blvd.
Go south (right turn if
coming from downtown
Littleton) on Datura St,
almost 1/2 mile from
Littleton Blvd
The Bemis Public Library is
on the east side of the street
at 6014 S. Datura St.



**Colorado Radio Collectors
Antique Radio Club
4723 Woodbury Dr.
Colorado Springs, CO 80915**

1st Class Mail

