FEEDBACK

THE OFFICIAL NEWSLETTER OF THE

GEORGIAN BAY AMATEUR RADIO CLUB INC.

Oct 1994

Sponsoring

VE3OSR FM REPEATER	146.940-	Mhz	BARROW BAY
VE3OST FM REPEATER	145.290-	Mhz	OWEN SOUND
VE3GBT FM REPEATER	146.895-	Mhz	MARKDALE
VE3IJD PACKET BBS	145.630	Mhz	KEADY

REGULAR EVENTS

GBARC MEETINGS: FOURTH TUESDAY OF EACH MONTH

BREAKFAST MEETINGS: SECOND AND LAST SATURDAY OF EACH MONTH

GBARC INFORMATION: INFORMATION REGARDING MEMBERSHIP SHOULD BE DIRECTED TO TOM VE3NEM 519-371-9499

Minutes of the September 27th 1994 meeting at Billy Bishop Airport

First we watched a video about a Bell Canada project to put in a fiber optic cable from Toronto to Manitoba, then Ron Snyder from Bell told us a little about how fiber optic and regular wire cables are spliced together.

After the program the meeting was opened by president Ken VA3KMS with 31 members present. We dispensed with reading the minutes of the last meeting.

An executive meeting had been held at Kens home on sept. 15th. The Port Elgin group will hold ham classes in the new year so we will plan to start our classes this fall. A few members volunteered to help teach.

The Santa Claus parade will be on Nov. 19th, a number of members with HTs will be needed to provide communication.

To raise some much needed funds for the club we plan to get involved with BINGO, we will need about a dozen guys and would earn about $1000.00 per night, we are now on the waiting list. The club may also be able to get Wintario money.

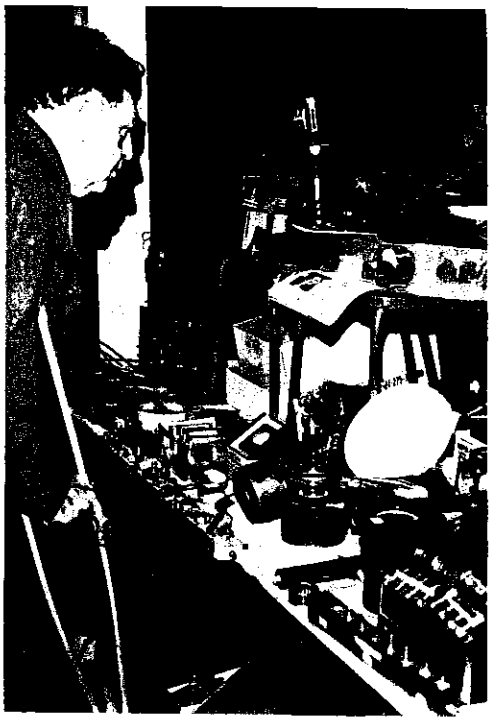
A Christmas dinner is planed for some time in November at the Georgian Club, cost will be about $15.00 per person.

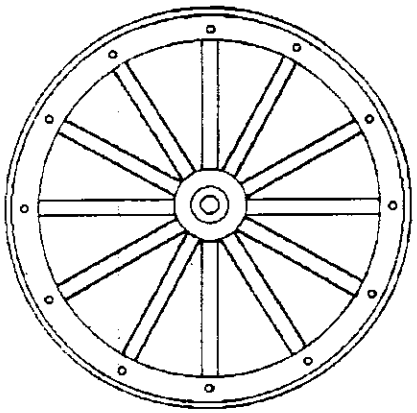
On Oct. 15th the scouts will have Jamboree on the air. The 50/50 draw was won by Jack KA1QU... A packet meeting was held after the club meeting...VE3MWU

MEETING PLACE

Our meeting place for the OCTOBER club meeting will be at the **Billy Bishop Airport WEST OF Woodford**....on Hwy 26...editor

1994 GBARC Fleamarket





HERITAGE AMATEUR RADIO CLUB

COBOURG-PORT HOPE

ONTARIO

THE HERITAGE AWARD OF ONTARIO

Will be awarded to: Amateur radio stations, or SWL's anywhere in the world who complete the following contacts:

ONTARIO stations must make 2 way logged contact (or SWL heard) with **50** different **ONTARIO [VE3]** amateur radio stations, **10** of which must be along that portion of **ONTARIO'S HERITAGE HIGHWAY** (old #2) from Toronto to the Quebec border.

If Highway #2 is in a city or town, the postal address is confirmation that the station is a **HERITAGE HIGHWAY** contact. (Metro Toronto, R.R. #6 Cobourg, etc.)

As the **HERITAGE AMATEUR RADIO CLUB** meeting place is at the Port Hope Yacht Club, adjacent to Highway #2, all club members qualify as **HERITAGE HIGHWAY** contacts.

The rest of North America (Canadian provinces and U.S. states) require **30 VE3** contacts with **6** along the **HERITAGE HIGHWAY.**

OUTSIDE North America **(DX)** require **15** contacts with **3** along the **HERITAGE HIGHWAY.**

QSL's ARE NOT REQUIRED.-ANY BAND-ANY MODE

A copy of logged contacts including: date, time, frequency, mode, call sign, rst, name, and location, together with an alphabetical check list with an **asterisk (*)** denoting **HERITAGE HIGHWAY** contacts, must be mailed or delivered to the club address as shown below. Successful applicants will receive **THE HERITAGE AWARD of ONTARIO** by mail or at a club meeting and their names will be published in the **CLUB BULLETIN.**

Please include **$4:00** Canadian, U.S. or I.R.C.'s to cover costs.

Commencement date is **July 1st 1992 at 00:00 Hrs. Z,** the 125th anniversary of Canadian Confederation.

CLUB ADDRESS: Awards Chairman: Eric Olsen, VE3GGO. 7 Skye Valley Drive, R.R. #4. Box 12. Cobourg, Ontario. Canada. K9A 4J7.

7 Skye Valley Dr. R.R.#4.
COBOURG, ON. K9A4J7.
Oct. 4/94.

Hello Tom:

I received your name from VE3DKF Jim, in Sauble Beach when I had a nice QSO with him today. He tells me that you are a very active club editor and I thought you might need something to fill some space sometime, hence I have enclosed the Heritage Award of Ontario. Maybe you can run it sometime for your members.

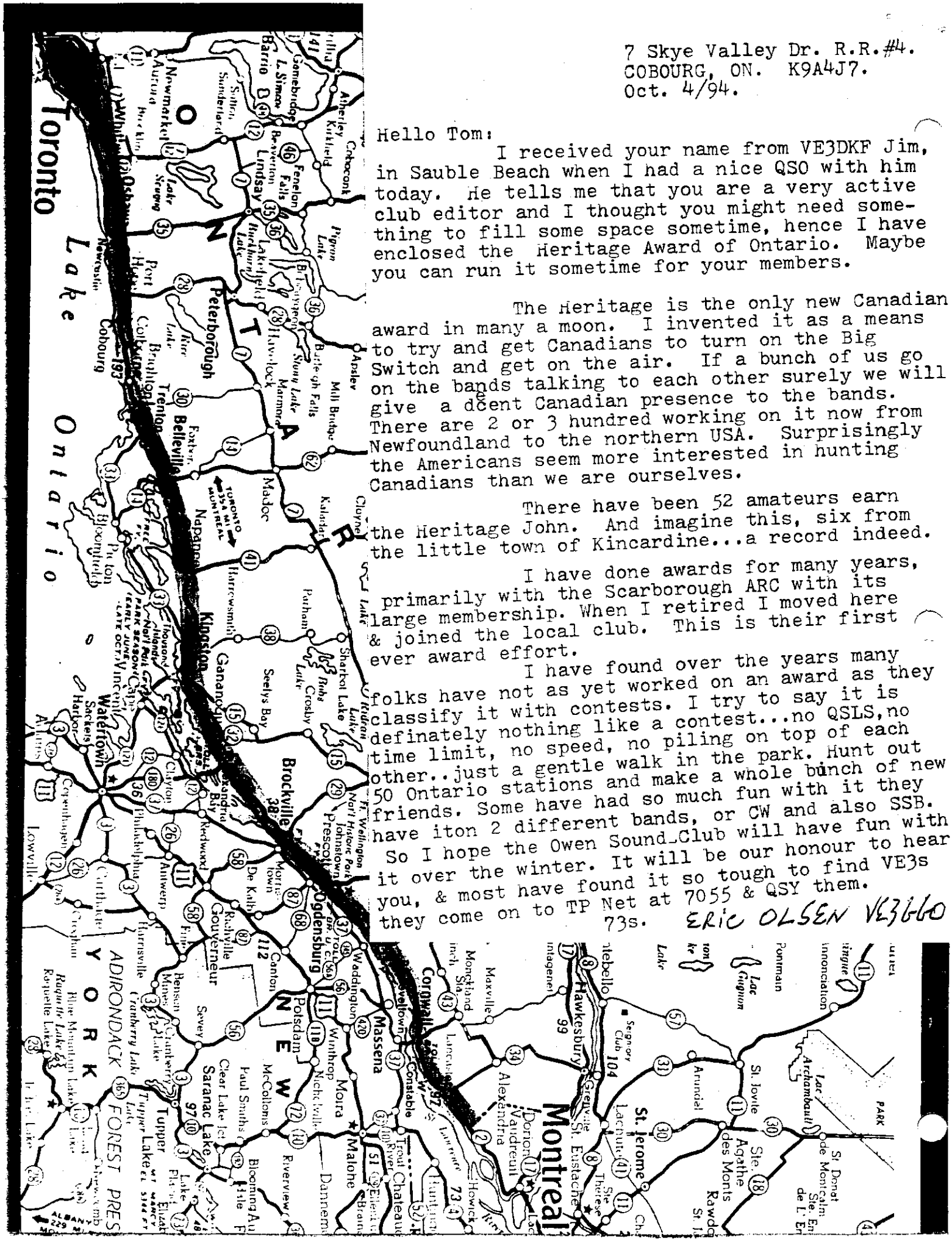
The Heritage is the only new Canadian award in many a moon. I invented it as a means to try and get Canadians to turn on the Big Switch and get on the air. If a bunch of us go on the bands talking to each other surely we will give a dcent Canadian presence to the bands. There are 2 or 3 hundred working on it now from Newfoundland to the northern USA. Surprisingly the Americans seem more interested in hunting Canadians than we are ourselves.

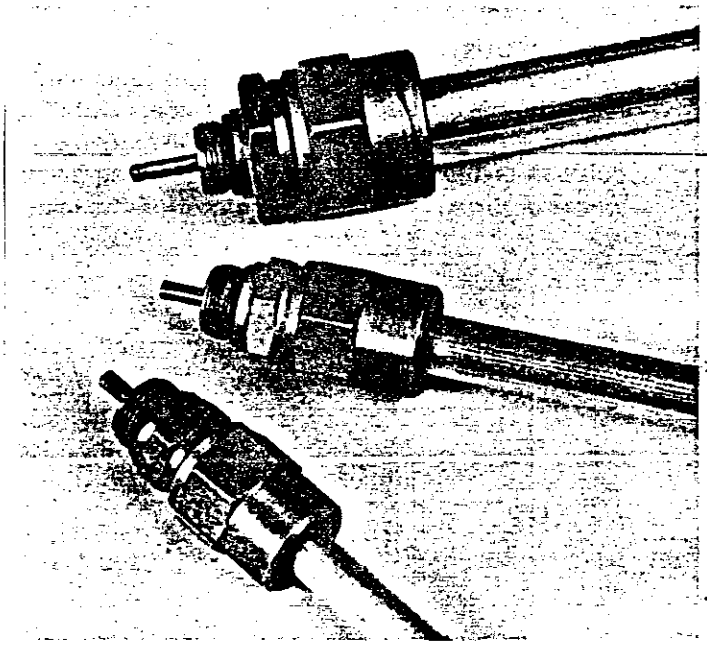
There have been 52 amateurs earn the Heritage John. And imagine this, six from the little town of Kincardine...a record indeed.

I have done awards for many years, primarily with the Scarborough ARC with its large membership. When I retired I moved here & joined the local club. This is their first ever award effort.

I have found over the years many folks have not as yet worked on an award as they classify it with contests. I try to say it is definately nothing like a contest...no QSLS, no time limit, no speed, no piling on top of each other..just a gentle walk in the park. Hunt out 50 Ontario stations and make a whole bunch of new friends. Some have had so much fun with it they have iton 2 different bands, or CW and also SSB. So I hope the Owen Sound Club will have fun with it over the winter. It will be our honour to hear you, & most have found it so tough to find VE3s they come on to TP Net at 7055 & QSY them.

73s. ERIC OLSEN VE3GGO





75-ohm cable in amateur installations

Making use of 75-ohm CATV cable results in lower line loss, which means more power to the antenna

Many hams are not aware of one of the best coaxial cables available, the 75-ohm, solid-aluminum sheathed cable made specifically for cable television (CATV). The coax used in these systems is characterized by a minimum attenuation loss, minimum random-signal pickup, excellent weather resistance, and high structural return loss. All this not withstanding the fact that it can usually be obtained as scrap for next to nothing.

*The number assigned to each cable is actually the outside diameter of the aluminum sheath in inches. With cable of primarily U.S. manufacture, this number has become the generic name of the cable.

Leading the list of features is low attenuation loss. As a result, a 100-watt-output, 420-MHz transmitter, feeding power through 30.5 meters (100 feet) of 0.750* hardline, will deliver 75 watts to the antenna; this is quite an improvement over the 40 watts delivered by a comparable length of RG-8/U!

To further illustrate, **fig. 1** shows the loss exhibited by several different types of cable, starting with the relatively lossy RG-58 and ending with 0.750 cable. With CATV cable, even at the lower frequencies, impressive gains are available to people who use long cable runs.

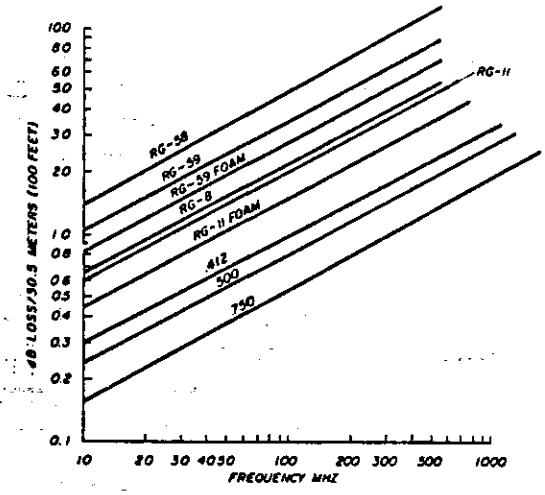
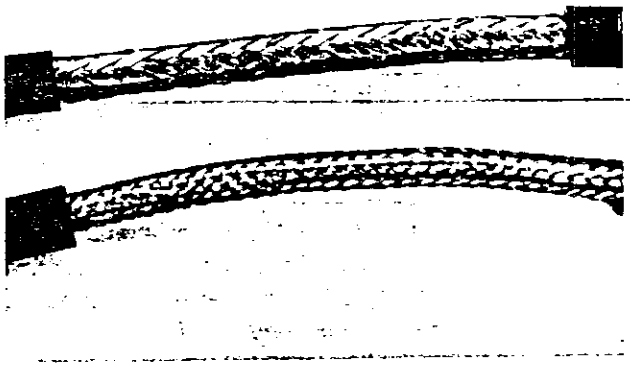


fig. 1. Loss *vs.* frequency for several types of cable. The CATV cable examples refer to cable manufactured by Systems Wire and Cable, Inc., of Phoenix, Arizona. Cable from other manufacturers may have different attenuation values, but as a rule will be very close to these figures.

In addition to its lower attenuation figures, solid aluminum sheath also reduces random-signal pickup and leakage. The best military braid specifications require only 96 per cent shielding, as compared to the 100 per cent provided by seamless CATV cable. And, as it turns out, most braided cable used by amateurs has a braid coverage in only the 75 to 90 per cent range, and sometimes as low as 60 per cent (see photograph)!

Weather resistance is also greatly improved by using cable with a seamless sheath. After a period of

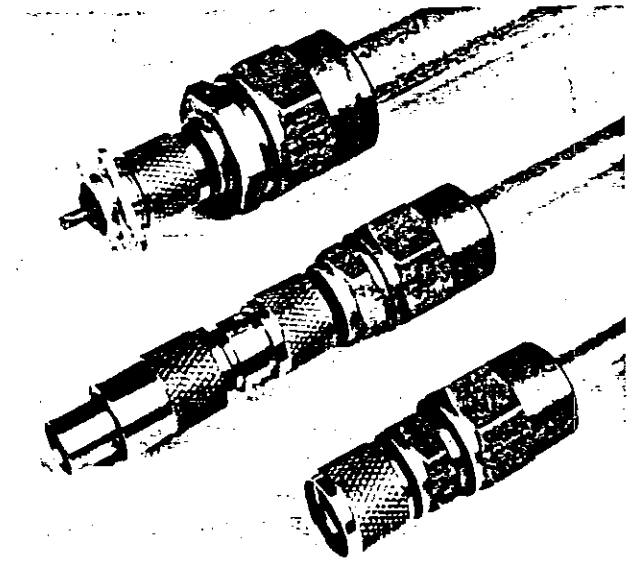
By Gordon K. Woods, W7VK, 6022 North Second Avenue, Phoenix, Arizona 85013



As seen in this photograph, braid coverage can vary radically. The two examples are both RG-59/U, except that the top cable is normally used in CATV installations. Use of the bottom cable may result in unwanted signal pickup and/or emission.

exposure to sunlight and air, the copper conductors in ordinary braid become corroded; they do not form an electrical bond to one another, but function more as insulated wires, increasing random-signal pickup and radiation losses. This can be easily checked by terminating a well weathered RG-8 line and noting the background noise level. Then, change to CATV cable, equally terminated, and your receiver will be dead.

CATV cable is normally bare, but it is also produced with a black polyethylene jacket if the cable is to be exposed to salt spray, fog, or industrial contaminants. It is also manufactured with a "flooded" polyethylene jacket for underground or underwater installation.



Different examples for using the adapters between 75-ohm CATV hardline and standard UHF connectors.

connectors

The major problem encountered by amateurs using 75-ohm CATV cable has been finding suitable connectors to use between the cable and ordinary UHF fittings. (Special cable connectors which mate with type N and F fittings are available, but they are difficult to locate and buy in small quantities.) There is a practical solution to this problem, however. This is the use of standard CATV "feedthrough" connectors, which, fortunately, end up with 6.5 mm (1/4 inch) of male 5/8 x 24 (M16-2) thread, the same thread as standard UHF connectors.

Making the adapter begins, as shown in fig. 2, with the installation of the appropriate feedthrough connector on the end of the cable. To mate with the UHF connectors, a PL258 female-to-female adapter is slipped over the end of the exposed center conductor.

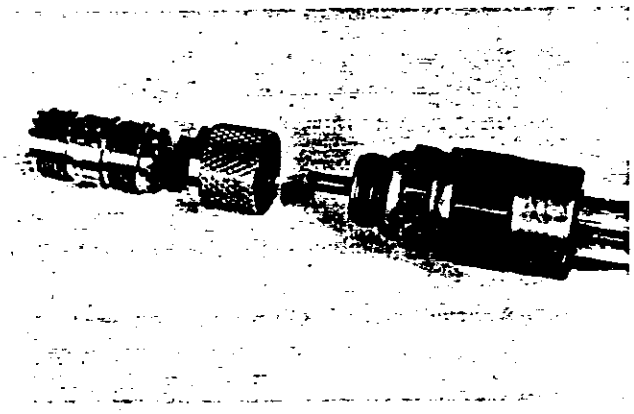


fig. 2. As shown in this photograph, adapting CATV cable to a normal UHF connector requires the use of a CATV feedthrough connector attached to the end of the cable. The 0.500 cable in this illustration has the brass tubing sweated over its center conductor. The threaded coupling cut from a PL259 connector attaches the PL258 adapter to the feedthrough connector.

Joining the adapter and feedthrough connector is accomplished by using the threaded portion of the barrel from a PL259 connector.

On the 0.412 and 0.500 cable, you will have to sweat solder a piece of 4-mm (5/32-inch) OD brass tubing over the center conductor. (The brass tubing is available in short lengths from most hobby stores.) The center conductor of the 0.750 cable is heavily tinned to increase its diameter from 3.7 to 4 mm (0.146 to 0.156 inch).

If you want to directly hardwire the CATV cable to an SO-239 chassis connector, prepare the cable end as shown in fig. 3. Then, connect the SO-239 to the feedthrough connector, prior to inserting the cable. The final step consists of inserting the cable into the feedthrough connector, making sure that the center conductor mates with the SO-239, and tightening the cable ferrule. Generally, connectors are available from CATV equipment supply sources, although they

are not enthusiastic about small-quantity orders. (Try these sources only if you can't con the local CATV system installer out of a few.)

installation

When installing solid-sheath aluminum cable, note that all bends should be made over a grooved form block. Also ensure that all bends are *never* made to a radius of less than ten times the cable diameter. Observing this precaution will prevent wrinkling the sheath, which can cause impedance bumps. Too tight a bend may also force the center conductor to one side, since the foamed dielectric is soft and subject to cold flow.

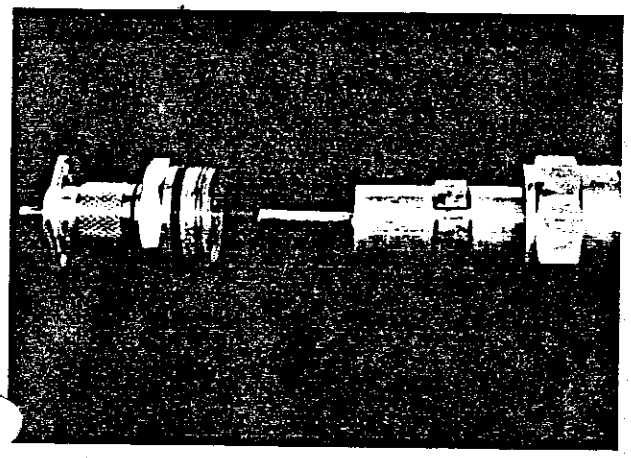


fig. 3. Attaching the hardline to a chassis-mounted SO-239 can be accomplished in the same manner. In this case though, the feedthrough connector and the SO-239 are mated before the cable is attached.

Another item available from equipment supply stores is special heat-shrink tubing that slides over the entire connector assembly. These tubes are usually about 23 cm (9 inches) long and have a special sealant inside that is effective against moisture.

summary

Before changing to 75-ohm transmission line, it is best to ensure that your transmitter and antennas will match the higher impedance. In general, most transmitters with a pi network will match the impedance presented when using 75-ohm cable. Even gamma matches on Yagi arrays can be readjusted to match the new cable. Unfortunately though, it can be an expensive proposition if you try to change your power meters to read correctly in a matched 75-ohm system.

Even with the small problems presented by connectors and, in some cases, matching, the use of 75-ohm CATV cable has one big advantage: more power at the antenna at a highly economical price.

matching 75-ohm CATV hardline to 50-ohm systems

The previous article by W7VK pointed out the significant attenuation differences between the more commonly used RG-8 type coaxial cables and 75-ohm CATV type "hardline." In some amateur installations, changing to hardline could mean large increases in the power delivered to the antenna, especially where long cable runs are being used. As Woods pointed out, switching to this type of cable usually involves only antenna rematching and retuning the transmitter. Unfortunately, in some cases, rematching the antenna to 75 ohms is not possible, and the resultant swr may be intolerable; the ultimate isolation between sections of a repeater duplexer, for example, can be degraded by a high swr on the line. The matchable bandwidth of an antenna can also be reduced, since the output pi network was originally designed for 50-ohm loads. And finally, 75-ohm power meters are not commonly available.

matching

The standard quarter-wavelength transformer or Q section, one of the most popular forms of matching, is unfortunately not readily suited for this task. The impedance of the matching section has to be the geometric mean between the two impedances to be matched, or in this case $\sqrt{Z1 \cdot Z2} = 61.3$ *ohms*, not a common coax impedance value.

One little-known matching technique, the nonsynchronous impedance matching transformer, does offer a solution to the problem. W5TRS originally described this method in *ham radio*,[1] though only providing basic design information (see fig. 1). In a subsequent letter,[2] W3DVO briefly discussed the bandwidth in relation to a standard quarter-wavelength transformer. Until now, however, nothing has been published on the use of the nonsynchronous transformer. Since the required sections are the same impedance as those to be matched, this method would seem to be an easy solution to the 75-to-50 ohm matching problem, and warrants further examination.

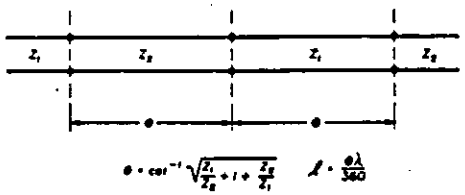


fig. 1. Diagram of the basic nonsynchronous matching transformer as described by W5TRS. The lengths of the two matching sections will vary according to the impedance ratio.

To evaluate this method, I decided to compare the nonsynchronous transformer to another technique, stub matching. Fig. 2 illustrates the situations that were considered. (If the load were replaced by an antenna, the system would not be too different from a typical antenna installation.) The main feedline was considered to have a 1 dB insertion loss and be 0.25 wavelength long at the center frequency. Since there will be a perfect match at only one frequency, having the feedline 0.25 wavelength long provided the maximum impedance change at other than the center frequency. This, along with the low insertion loss, will provide close to the worst-case swr. The matching sections were considered to be lossless lines.

table 1. Impedance values along the lines shown in fig. 1.

	nonsynchronous transformer			
frequency, MHz	point A	point B	point C	final swr
144	74.63 + j0.63	75.34 − j0.50	49.86 − j0.44	1.0093
145	74.82 + j0.31	75.15 − j0.24	49.93 − j0.21	1.0044
146	75.01 − j0.02	74.99 + j0.02	50.00 − j0.01	1.0002
147	75.20 − j0.36	74.85 + j0.29	50.08 + j0.22	1.0047
148	75.37 − j0.70	74.72 + j0.56	50.16 + j0.41	1.0089

	stub matching			
frequency, MHz	point A	point B	point C	final swr
144	75.60 − j0.12	75.75 − j0.18	50.02 + j0.86	1.0173
145	75.31 − j0.06	75.39 − j0.09	50.00 + j0.42	1.0084
146	75.02 − j0.00	75.03 − j0.01	50.00 − j0.02	1.0004
147	74.74 + j0.05	74.67 + j0.06	49.99 − j0.01	1.0002
148	74.45 + j0.12	74.30 + j0.11	49.97 + j0.04	1.0009

test results

Table 1 shows the different impedance values as the 50-ohm load was rotated back toward the generator. In actuality, the values were determined with the aid of an HP-25 programmable calculator; the use of the Smith chart was precluded since the final differences were extremely small, and beyond the *accurate* resolution of even an expanded chart.

Because the initial results proved so favorable, another set of calculations were performed. This time, instead of the relatively narrow bandwidth afforded by the 2-meter frequencies (approximately 1.5 per cent), calculations were carried out for 80 through 10 meters, with the 80-meter extreme of 6 per cent bandwidth. **Table 2** shows the results for the nonsynchronous transformer when applied to **fig. 2A.**

As a final test, the line was terminated with eight different reactive loads, each selected to be on the 2:1 swr circle on a Smith chart (see **fig. 3**). The inner points represent the same impedances, but as seen at the generator (transmitter) end after the different rotations. **Table 3** lists the actual computed values.

summary

The nonsynchronous impedance matching transformer can be an extremely valuable tool. With a bandwidth basically comparable to either stub or

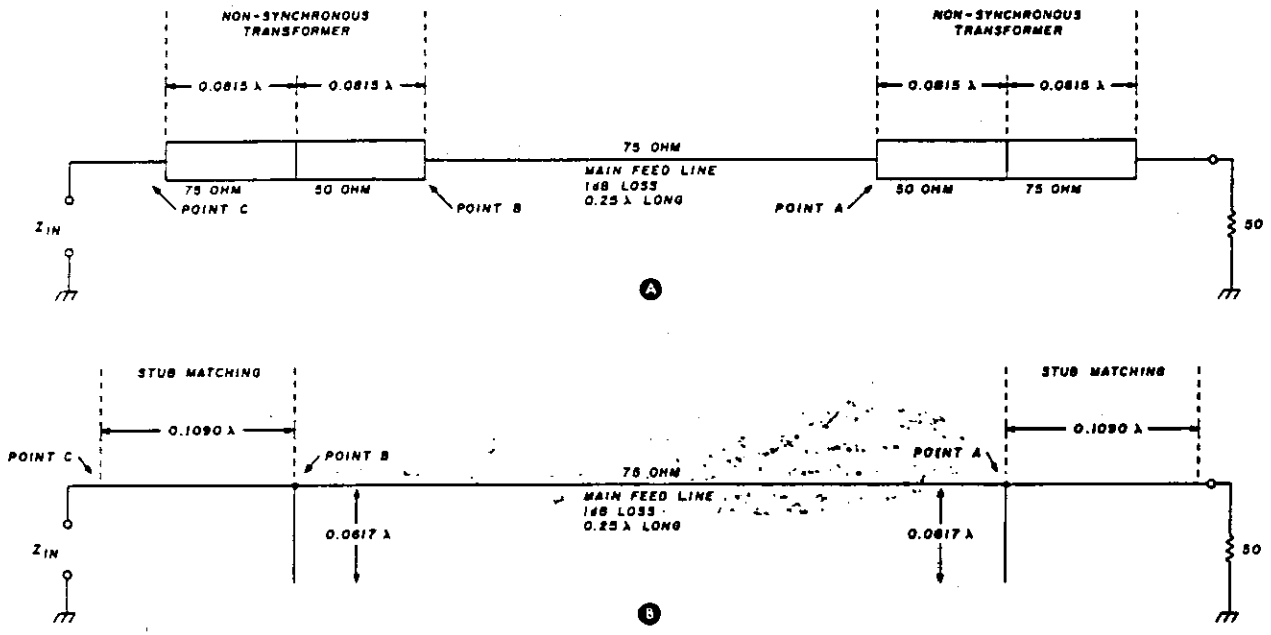


fig. 2. Schematic diagram of the system used to evaluate the bandwidth of the two matching systems. The main feedline, as used in both systems, has 1 dB loss. Points *A*, *B*, and *C* correspond to the impedance values listed in the tables.

table 2. Swr values for the nonsynchronous transformer when used for 80 through 10 meters.

frequency, MHz	final swr	frequency, MHz	final swr
3.5	1.0571	14.3	1.0048
3.6	1.0322	14.4	1.0091
3.7	1.0091	21.0	1.0063
3.8	1.0086	21.1	1.0029
3.9	1.0224	21.2	1.0003
4.0	1.0319	21.3	1.0034
7.0	1.0150	21.4	1.0059
7.1	1.0045	28.0	1.0097
7.2	1.0038	28.2	1.0045
7.3	1.0188	28.4	1.0003
14.0	1.0097	28.6	1.0048
14.1	1.0045	28.8	1.0091
14.2	1.0003		

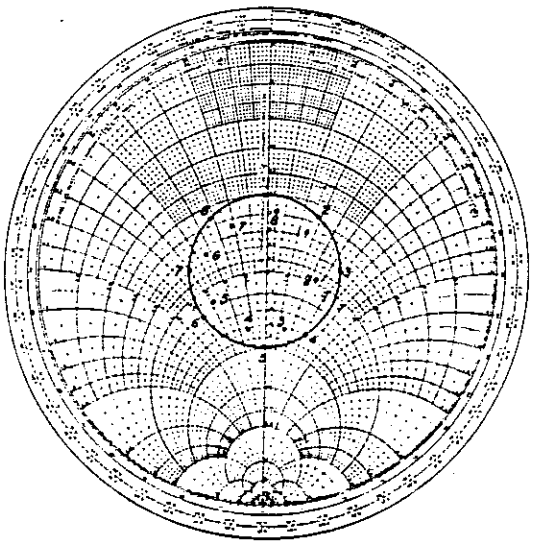


fig. 3. Smith chart presentation of the eight reactive loads used to terminate the line. The inner points represent the final impedances as seen at the transmitter end.

Q-section matching, it has the added advantage of requiring one-third less coax than the quarter-wavelength section and one-half less than a stubbed system. Though these differences may not be significant at vhf, they can save a considerable amount of cable on 80 through 10 meters. In addition, the construction of a nonsynchronous transformer appears to be inherently easier than that of a stub system because of the difficulty in correctly placing a T-type connector. Probably the two biggest disadvantages are that the feedlines have to be dedicated to a particular band (since each transformer length is frequency dependent), and the requirement that the coax be the same impedance as those to be matched. These factors certainly prevent its qualifying as an all-encompassing matching method, but it more than adequately will handle the problem of matching 75-ohm CATV hardline to a 50-ohm system.

table 3. Computed swr values at 14 MHz with the line terminated in reactive loads.

termination	computed impedance values	final swr
25.00 ± j0	34.17 + j15.90	1.7097
28.09 + j14.90	48.40 + j26.48	1.7040
40.02 + j30.01	74.23 + j22.41	1.7080
69.53 + j36.84	83.89 − j10.66	1.7193
100.0 ± j0	59.09 − j28.80	1.7311
69.39 − j36.86	39.16 − j22.24	1.7367
39.95 − j29.96	30.58 − j9.84	1.7327
28.06 − j14.85	29.21 + j3.11	1.7215

references

1. Henry Keen, W6TRS, *ham notebook, ham radio*, September, 1975, page 66.
2. Raymond Aylor, W3VDO, *comments; ham radio*, May, 1976, page 63.

ham radio

By Charles J. Carroll, K1XX, *ham radio*,
Greenville, New Hampshire 03048

A lot of people don't have much to say, and that's fine. The trouble with some of them is you have to listen a long time to find it out.

WANTED

ARTICLES , STORIES, CARTOONS FOR FEEDBACK, THERE ARE STILL PLENTY OF MEMBERS WHO HAVE NOT SENT ME *THEIR* STORY...*EDITOR*

VE3CUV ROSS .. 599-3870

ALL ITEMS ARE 1 OWNER AND MINT CONDITION... WILL NOT BREAK UP GROUPS FOR SEPARATE SALES.

YAESU FT-1000D HF RIG (200WATT) NEW PRICE $5780 ASKING $3900 MD-1 DESK MIKE ,YAESU PHONE PATCH/SPEAKER ,HANDHELD MIKE, SERVICE AND OPERATING MANUALS, STEREO EARPHONES ----------

ICOM IC-24AT DUAL BAND HANDHELD NEW PRICE $971 ASKING $690 BP-85 BATTERY BP-82 BATTERY BOTTOM CAP HM-46 SPEAKER/MIKE AEA HOT ROD ANTENNA BC-72A DESK CHARGER OPERATING MANUAL ----------

FP-12 YEASU POWER SUPPY $150

DRAKE TR-7 HF RIG (100WATT) $2000 PS-7 POWER SUPPLY AND PR-7 FAN, MN-7 TUNER (BANDSWITCHED) AUX-7 BOARD (EXTRA BAND) NOISE BLANKER BOARD ,250 HZ CW FILTER, REMOTE AUX VFO, ALL MANUALS ----------

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REMOVAL OF UNITS AS A WHOLE BY PURCHASER

VE3TFQ JIM 369-6596

2 METRE ALL MODE MODULE FOR THE FT767 HF RIG WITH INSTRUCTIONS AND MANUAL $200 SHIPPING INCLUDED....CURRENT PRICE IS $349 PLUS TAX.

PLEASE CONTACT JIM ROWE VE3TFQ IN DURHAM

OFFICE 519-369-2622

HOME 519-369-6596

FAX 519-369-5828

Amateur radio course

An Amateur Radio course is being offered this fall, probobly mid November. Enclosed in this issue of FEEDBACK is a small flyer which I hope you can get posted in a conspicuous place so that the word gets out. Grocery stores, Post Office or just about any public place in your community will suffice....73 and thanks in advance....tom