RADIOPHILIE QUÉBEC

Société Québécoise des Collectionneurs de Radios Anciens Inc.

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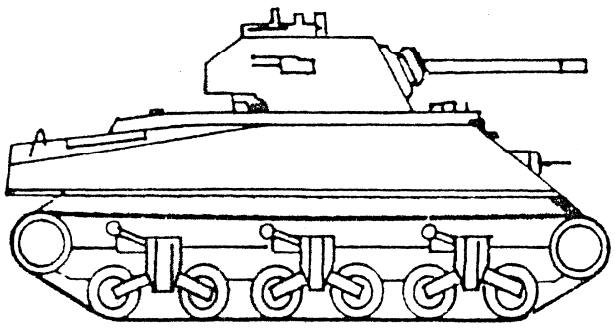
Spécial Militaire

19 MK III



Char Sherman

PUBLICATION BIMESTRIELLE POUR COLLECTIONNEURS DE RADIOS ANCIENS ET MATÉRIEL CONNEXE

Radiophilie Québec est une publication bimestrielle, éditée par Michel Morin. L'adresse d'affaires de Radiophilie est:

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Parainnez un nouveau membre !

À la fin de décembre 1996, Radiophilie Québec procédera au tirage d'un abonnement gratuit pour l'année 1997. Tous les membres de la Société qui auront référé un nouveau membre à compter du 1 er Septembre 1996 seront éligibles au tirage au sort. Bonne chance.

L'abonnement à Radiophilie est jumelé avec l'adhésion à La Société Québécoise des Collectionneurs de Radios Anciens Inc. Une contribution de $40.00 accorde à l'abonné le privilège d'être membre de la Société pour une année et de recevoir 6 numéros de Radiophilie Québec. Cependant, les numéros peuvent être consécutifs ou rétroactifs. Il n'est pas nécessaire d'être un collectionneur de radios pour adhérer à la Société, ni pour recevoir la revue Radiophilie. Nous invitons les organismes, clubs de Collectionneurs, associations, etc., à s'annoncer sans frais dans les pages de Radiophilie Québec, en autant que cela soit réciproque pour la Société, dans leur publication. Radiophilie accepte également de publier des bulletins d'intérêt public.

TABLE DES MATIERES

Club d'Ondes Courtes du Québec

CP 61, Anjou (PQ), CANADA, H1K 4G5

☎ Le jour (de 15:00 à 23:00 TUC): (514) 648 2929 - André Hemlin

Fondé en septembre 1974 par Guy Marcotte, le Club d'Ondes Courtes du Québec est un organisme à but non lucratif: tous ses participants sont bénévoles, ne recevant aucun avantage privilégié. Le club vise à promouvoir l'amitié entre les DX-istes en popularisant la réception des ondes radio au moyen de sa publication mensuelle, L'ONDE.

Cotisation annuelle (pour 12 numéros)

CANADA et ÉTATS-UNIS : **39.00 $ CAN**	FRANCE : **230FF**	AUTRES PAYS : **53.00 $ CAN**

Cette cotisation ne fait que couvrir les dépenses effectuées par les responsables ce qui est insuffisant pour permettre l'existence du club et de sa revue. En plus de votre cotisation le C.O.C.Q. a besoin de votre participation volontaire temporaire dans la gestion du club et/ou au contenu de sa revue.

Éditorial

Au moment de mettre sous presse, je me prépare fébrilement pour l'événement du 2 et 3 novembre à Eastman. Comme nous l'avions annoncé, la Société organise cette année l'exposition thématique du 5ième salon des Antiquaires à Eastman, près de Magog en Estrie. Il est fort probable qu'au moment où vous lirez ces lignes, l'événement sera un fait accompli. Somme toute, Radiophilie publiera des photos dans le prochain numéro de Janvier 1997.

Comme vous le constaterez, le présent numéro consacre la page couverture au domaine militaire. Bien que nous ayons très peu de collectionneurs de ce type d'appareils, j'ai cru quand même intéressant d'y consacré une chronique sur le modèle 19 Mark III, un émetteur-récepteur produit au Canada, USA et Grande-Bretagne, durant la dernière guerre mondiale. Je me souviens personnellement d'avoir vu ces appareils dans les surplus militaires il y a plus de 20 ans, qu'on pouvait se procurer entre 20$ et 40$. Aujourd'hui, ils valent leur pesant d'or (550$ à 600$, selon certains). Évidemment, cet appareil n'est pas destiné au collectionneur pour qui l'aspect technique est un handicap, car pour paraître compliqué, cet appareil l'est assurément ! Monsieur André Guibert, nous présente cet appareil méconnu et j'espère que comme moi, vous vous coucherez ce soir, moins niaiseux qu'au lever ce matin....

Une autre chronique qui va faire du bruit est celle de notre confrère Guy Giroux sur l'avènement du radio transistor. Un bon article étoffé de textes d'époque. Bien que l'anglais semble prédominant dans cette chronique, nous croyons que nos lecteurs sont assez familiers avec cette langue et apprécieront à sa juste valeur l'exposé et les détails de cette chronique. Nos amis américains spéculent sur nos petits transistors, le saviez-vous ? Le TR-1 vaut une petite fortune là-bas, et si je vous dis cela, ce n'est pas pour vous encourager à vous lancer dans l'import-export des premiers modèles de transistors vendus au Canada....Néanmoins, je suis certain que plusieurs d'entre nous vont commencer à ouvrir l'oeil dans leur quête de radios de collection, partout, dans les ventes de garage et les marchés aux puces. Et c'est tant mieux ! Plus il y aura de collectionneurs, plus il y aura de ces beaux petits modèles qui seront épargnés de l'extinction, au grand plaisir des futures générations...

Voilà, nous sommes maintenant à la fin de 1996, et du même coup, Radiophilie Québec entame sa deuxième année d'existence. Je tiens à souligner qu'en 1995, il n'y a eu qu'un seul numéro, soit le volume 1, numéro 1, car cette édition paraissait pour la première fois en novembre 1995. Ce numéro fut édité et publié à 50 exemplaires. Si vous êtes de ceux qui en possédez un, conservez-le précieusement, car je prédis qu'un jour, ce numéro sera lui-même un item de collection très convoité.(Ce numéro ne sera jamais réédité, je vous l'assure). Je termine en vous offrant mes meilleurs voeux pour l'année 1997. Bonne chance!

L'exposition du 7 septembre 1996

Par Guy Giroux

Je vous donne ici un bilan de l'exposition du 7 septembre dernier. Dans l'ensemble, cela s'est bien passé. Nous avons reçu environ 300 visiteurs. Ces derniers paraissaient pas mal emballés de voir toutes ces pièces de collection. J'avoue cependant avoir manqué de "timing" pour notre publicité, cependant malgré tout, 300 visiteurs, c'est quand même pas si mal....

Les exposants m'ont semblé assez satisfaits et ils ont pu s'entretenir à volonté de leur passion commune. Le seul "hic" de cette exposition fut le manque de participation des membres. Plusieurs sont venu sans toutefois exposer, ce qui fait que notre salle paraissait très grande. Évidemment, chacun est libre et personne n'est obligé, mais je crois que si nous désirons que notre Société soit davantage connue, il faut prendre les moyens qui s'imposent. La visibilité des membres dans plusieurs expositions est un excellent moyen d'y arriver, et sans compter que plusieurs exposants ont trouvé cela pas mal lucratif la dernière fois....

Je me propose de tenir une autre exposition au printemps, à Montréal-Nord, mais cette prochaine fois, à grand renfort de publicité. Tel que promis, j'utiliserai les journaux locaux. Je devrai également m'assurer d'un nombre minimum d'exposants, et les frais de location des tables seront payables d'avance (au maximum de 15.00 la table il n'y aura personne qui s'appauvrira) .

Encore merci à tous nos exposants, car

grâce à vous, la Société a fait un autre pas en avant. J'attends impatiemment vos appels afin de vous réserver une table pour le printemps.

Guy Giroux

(514) 385-6328

Dans le prochain numéro de Janvier '97

Notre confrère Pierre Watier, membre no:20, nous propose une idée concernant la disposition de votre collection de radios en cas de décès. C'est vraiment bien.

Notre ami Guy Giroux nous suggère une carte de visite, ou carte d'affaires, pour tous les membres de la Société. Vos suggestions quant aux modèles à proposer sont les bienvenues! On débat le sujet à fond dans notre prchaine édition !

A vendre

Maurice Giroux désire disposer d'un Westinghouse en bois, modèle 527 ATX 1932. Prix demandé $50. ou au plus offrant.

RÉPERTOIRE DES MEMBRES ET COLLECTIONNEURS DE LA S.Q.C.R.A. inc.

SQCRA No. de Membre	Changements depuis le dernier numéro	COLLECTIONNEUR Nom, Adresse, Téléphone Télécopieur, Code postal Adresse Internet (E-Mail)	Genre de collection Spécialité,intérêts divers Autres collections Autres renseignements	Quantité de radios Facultatif
10		ARNASON Orn 7, Hillside, Box 207 Knowlton, QC J0E 1V0 (514) 243-6934	Brome County Historical Society Fessenden Radio Display	± 400
09	**Directeur au Conseil d'administration de notre Société**	ARSENEAU Michel 17 rue Duclos Decelles Boucherville, QC J4B 7Y8 (514) 449-4336 Rés.	- Radios modèles de Table, - Art Deco - Bakelite, Catalins - Tubes à vide usagés à vendre	
38		BAILLARGEON Guy 224 rue Church Cowansville, Qc. J2K 1V3 (514) 266-7824 Tel. (514) 263-5260 Fax	Nouveau collectionneur Avocat de notre Société	
26		BÉLANGER Bertrand 863, Boulevard Ste-Anne C.P. 4, Pte-au-Père, QC G5M 1J1 (418) 724-2952	- Récepteurs ondes courtes à lampes de radio-communication - Microphones - Radio amateur VE2 TRA	± 50
54	***Bienvenue*** Nouveau Membre	**BOILY Denis** **11540, Ovide Clermont** **Montréal Nord, Qc** **H1G 3Y8** **(514) 322-1339**	**Possède également colection d'horloges de table, de réveils-matin et de téléphones à cornet.**	
39		BESSETTE Guy 5461, 29ième Avenue Laval-Ouest, Qc, H7R 3M2 (514) 627-3744	-Intérêt général -Cherche à obtenir le plus de diversité possible	± 50

11		BOUDREAULT Jean-Eudes (Boutique La Trouvaille) Marché aux Puces Carignan, Kiosque B-201 2373 Chemin Chambly Carignan, QC J3L 3P9	- Cabinets de Bois - Radios tout genre - 1935-1950 - Marchand et intermédiaire pour collectionneurs	± 15
40		BOURDAGES Gilles 540 rue Allard, C.P. 1347 Murdochville, Qc. G0E 1W0 (418) 784-3723 Internet: E-Mail: magie@québectel.com	-Intérêt général -Radios à lampes de 1920 à 1950 -Radios cristal -Colectionne aussi la monnaie.	± 12
14		CARRIER Jean 3289 Monsabré App.2 Montréal, QC H1N 2L6 (514) 252-8151	- Général - Radios à lampes	
24		CHENÉ Robert C.P. 340 Joliette, QC J6E 3Z6 (514) 759-0615	- Vieux TRF et Récepteurs militaires - Toute documentation, Manuels, plans, etc. sur la radio ancienne. Technicien électronique	± 150
07		CHENEY Dave 338 Arlington Cr. Beaconsfield, QC H9W 2K3 (514) 694-3240	- Crystal sets, TRF - Speakers, Cathedrals - Tombstones - Other collections - Telegraphs, telephones - Phonographs.	± 120
27		CHEVALIER Pierre 6336 De ST-Valier Montréal, Qc. H2S 2P5 (514) 271-2093	-Modèles de table -Bakelite -Plastique -Catalin -Métal	± 10
13	**Directeur au Conseil d'administration de notre Société**	CLÉMENT Eddy 6052 Chailly St-Léonard, QC H1T 1J9 (514) 254-3813	- Radios anciens des années '20 - Vieux haut-parleurs - Cornets, Amplions, - Transistors	± 20 radios anciens ± 50 transis-tors

45		CLICHE Jean C.P. 158 Lac-Mégantic, Qc G6B 2S6 (819) 583-4931 (tel & fax)	-Radios des années '20s et 30s. Modèles de table. -Radios à galène -Télégraphes, instruments, livres	± 150
52	***Bienvenue*** **Nouveau membre**	**COURBIN Patrice** **2480 rue Goyer** **Montréal, Qc. H3S 1G9** **(514) 731-5008**	*Désire débuter une collection de radios *Possède également une collection de caméras *Aime écouter les ondes courtes	
32		DOBBY Larry 157 Sedgefield Ave. Pointe-Claire, QC H9R 1N8 (514) 695-3528	- Atwater Kent seulement Tous les modèles -Radioamateur	
16		GAGNÉ Jean-Guy 235 Taschereau Cap-De-La-Madeleine, QC G8W 1L5 (819) 379-2408	- Les radios les plus anciens -Technicien, répare les radios à tubes	± 200
34		GENTILE Rock 759, 36e Avenue Lachine, QC H8T 3L2 (514) 637-2241	- Cathédrals - Grammophones	± 75
46		GIBEAULT André 2071, 1ère Concession Ell ' In RR 1, CSP Athelstan, Qc. J0S 1A0 (514) 879-2267 bureau (514) 879-2204 fax	-Radios militaires utilisés dans les véhicules. -Recherche équipement radio utilisé pour la réparation des radios MK19, 42, etc	
06	**Directeur au Conseil d'administration de notre Société**	GIROUX Guy 3183 Prieur Montréal, QC H1H 2K2 (514) 385-6328	- Bakelite - Plastiques - Catalins	± 80
19	**Directeur au Conseil d'administration de notre Société**	GIROUX Maurice 559 Hudon Laval, QC H7P 2L4 (514) 963-1601	- Bakelite - Catalins	± 125

25		GRÉGOIRE Sylvain 1405 Crémazie Laval, QC H7G 4E8 (514) 662-1962	- Cabinets de bois Années 1930-1940	± 60
12		GUAY Gilles 46, rang 5 St-Paul de Montmagny,QC G0R 3Y0 (418) 469-3171	- Radios très anciens - Consoles et modèles de table En général - Bois, Bakelite	± 65
36		GUIBERT André 333 Prom. Riverside Apt.710 St-Lambert, Qc. J4P 1A9 (514)923-4995	-Radios militaires -Armér, Marine, Aviation -Collection située à Austin, Qué. Visite sur rendez-vous seulement -	± 115
41	**Changement d'adresse**	HART Roger P.O. Box 403 Morrisburg, Ontario K0C 1X0 (613) 543-3337	- Breadboards - Vieux TRF - Amplions- cornets - Radios anglais GecoPhone -Radioamateur VA2 HBR	± 100
29		HOWARD Jimmy (Jim Electronique) 951 Bessette Granby, QC J2G 3C4 (514) 375-3952	Modèles spéciaux - Bois - Bakelite - Catalin Technicien TV Radioamateur VE2 JWH	± 40
35		JETTEN Denis 515 Hall Ile des Soeurs (Montréal)Qc H3E 1H3 (514)769-8063	Ingénieur en électronique	
17		LABBIENTO Giovanni 2335 Deschambault Duvernay, (Laval),Qc H7E 1E2 (514) 871-6536 (bureau)	-Radios 1930-1960 -Ondes courtes -Testers de lampes -Littérature sur la radio	± 15
53	***Bienvenue*** **Nouveau membre**	**LAFOND Pierre 3670, Papineau Trois-Rivières, Qc. G8Y 1N8 (819) 376-9163**	**Désire obtenir renseignements sur les radios "cathedrals"**	

15		LAMONDE Martin 265 Du Pont, Apt. 101 Québec, QC G1K 6L8 (418) 525-7404	- Radios années 20 Technicien électronique - Collectionne aussi les phonographes à cylindres	± 20
49	***Bienvenue*** **Nouveau Membre**	**LAPIERRE Guy 855, 40 ième Avenue Ville LaSalle, Qc. H8P 2Y2 (514) 365-6641**	**Membre du Musée des Ondes Berliner Collectionne aussi les magnétophones**	**± 5**
50	***Bienvenue*** **Nouveau Membre**	**LAROCHELLE François C.P. 49015 7275 Sherbrooke Est Montréal, Qc. H1N 1H0 (514) 252-8493**	**-Radios de bois des années 30-40 -Radios "2 portes" -Collectionne aussi les horloges anciennes**	**± 15**
37	**Directeur au Conseil d'administration de notre Société**	LARROQUETTE Christian 224 Decelles Bromont, Qc. J0E 1C0 (514) 266-4259 rés. (514) 777-0770 bureau	-Cathédrals -Modèles typiques -Technicien/réparation de radios anciens	± 40
51	***Bienvenue*** **Nouveau Membre**	**LAVOIE Rodrigue 3365, Beauchamps Sainte Foy G1X 2C7 (418) 658-2783**	**-Collectionne radios et haut-parleurs des années 20**	**± 50**
43		LECLERC Serge 171 Springfield Greenfield Park, Qc. J4V 1X5 (514) 465-1573	-Plastiques 1940s -Designs particuliers -Intérêt général	± 115
47		Le PAGE Jean 3197 Avenue Tewkesbury Stoneham, Qc. G0A 4P0 (418) 848-2658 tel. (418) 848-3998 fax Internet: E-Mail: Andree.lanoix@sympatico.ca	-Radiosde table, surtout de plastique, 1930-50 Intérêt pour designs variés et spéciaux. -Collectionne aussi outils anciens, boites de tabac 1880-1940	± 25

03	**Directeur au Conseil d'administration de notre Société**	LETENDRE Daniel 8, rue Gaétan Victoriaville, QC G6P 8G6 (819) 758-8301 (Bureau) (819) 758-9011 (Rés.)	- Modèles de table - Bois, Bakelite Tout genre	± 15
02		MATHEWS Jos 91 Trésor Caché Ville Lasalle, QC H8R 3K2 (514) 365-5061 (Rés.) (514) 395-5380 (Bureau)	- Premiers modèles de Transistors - TransOcéanic Zénith - Technicien Radioamateur VE2 BCL	± 20
44		MOREAU Denis 28, rue Highlands Lasalle, Qc. H8R 3N1 (514) 365-4970	-Intérêt -Collectionne également tubes-à-vide intéressants	**± 5**
01	**Président du Conseil d'administration de notre Société**	MORIN Michel 799 St-Etienne Granby, QC J2G 9N8 (514) 378-5664 rés. (514) 375-9193 fax Internet: E-mail radios@contact.net	- Radios très anciens - TRF - Cathédrals -Éditeur de votre revue	**± 200**
30		OTIS Yves 1650 Rue papineau Baie-Comeau, QC G5C 2J8 (418) 589-7319	- Général - Modèles table et consoles	
23		PAQUET Jean-N. 699 Rue Merry (Nord) Magog, QC J1X 2G9 (819) 843-6082	- Radios les plus anciens - Cornets, - Amplions, - Haut-parleurs	± 75
28		PHILIPS Jacques 213 Boul. Gouin St-Jean-sur-Richelieu, QC J3B 3C4 (514) 347-0481	- Radios à lampes - Général	± 15
04		POTVIN Claude 588 Rue Taillon Montréal, QC H1L 4J3 (514) 354-4323	- Métal - Bois - Bakelite - Plastique	± 150

18		POTVIN Laval Ste Cécile de Milton, QC J0E 2C0 (514) 777-2784	- Cathédrals - Bakelite - Transistors	± 150
08		POULIN Patrick 335 Boul. Hamel Vanier, (Québec) QC G1M 2R7 (418) 877-0759	- Catalins, Bakelite, - Bois Autres collections: - Jouets, Robots	± 150 20 Addison
31		ROBILLARD David 920 Rang Rivière ouest Ste-Brigide, QC J0J 1X0 (514) 293-3587	- Émetteurs - récepteurs à lampes Civil + Militaires - Radios anciens	± 40
33		ROUETTE Robert 4000 Cardinal Léger Apt.14 Trois-Rivières QC J8Y 2H2 (819) 379-8519	Surtout modèles de table - Bois - Bakelite	**± 60**
21	**Directeur au Conseil d'administration de notre Société**	THIBAULT Claude 538 Judd St-Eustache, QC J7R 4N8 (514) 491-2873 FAX (514) 491-1005	Radios Anciens à tubes Tout genre Possède inventaire d'environ 1000 tubes	± 80
05		THIBAULT Gilles 6221 De La Loire Montréal, QC H1K 3L5 (514) 354-4717	Radios anciens en général Téléviseurs, anciens appareils électroniques Désire se spécialiser davantage années '20	± 800
42		TREMBLAY Denis 11405 Rigaud Québec, Qc, G2A 3H3 (418) 842-9592	Intérêt général Collectionne tous les types de radios	± 300
20		WATIER Pierre 6 Terrasse Debien Auteuil (Laval) QC H7L 1K5 (514) 625-4015	- Radios Cristal, TRF - Cathédrals, Tombstones - Transistors. Tous les modèles des années 20	± 300

REGENCY TR-1

Par Jos Mathews

Historique du premier radio transistor produit en série

Quand on pense "Collection de radios", ce sont les modèles des années 20-30 qui viennent souvent à l'esprit et que l'on voit dans les expositions. Les modèles de table type Catalin, avec leur cabinet marbré attirent l'attention par leur beauté et leur inacessibilité. Certains radios, dont les Catalins, sont rendus hors de prix. De plus, les radios consoles, même s'ils sont encore abordables, prennent de la place.

Ainsi, des collectionneurs se sont tournés vers les "vieux" radios portatifs à transistors. Peu encombrants, encore abordables et pas si faciles à trouver; ils présentent une solution réalisable à ceux qui ont un problème de place et de finances. Les Nord-Americains ont produit des radios portatifs à transistors pendant une courte période des années 50 jusqu'au milieu des années 60. Depuis, tout radio pour usage domestique vient d'ailleurs. Pour nous, les radios transistors américains sont les plus accessibles, suivis par les modèles japonais et européens. Quelque modèles ont été produits au Canada, on ne les voit pas souvent. La plupart des petits radios ont carrément pris le chemin des poubelles.

En parlant de coût, le Regency TR-1 fait bande à part. Les Américains paient des prix faramineux pour ce petit radio sans performance. Mais cet appareil a toute une histoire, somme toute, un jalon technologique. C'était une porte ouverte sur tout ce qui est devenu "solid state". C'était aussi le début de la fin de la suprématie des Américains en matière de radio. Les Japonais ont vite pris et dominé le marché.

Dans les articles qui suivent, la première page vient de l'Internet, une infopub de Texas Instruments. Dans les années 50, il fallait être visionnaire pour suggérer une alternative à la technologie des lampes. La deuxième partie (6 pages), vient d'un article de l'"IEEE Spectrum", Dec. 1985, relatant l'histoire de la conception du Regency TR-1. Comme on peut lire à la page 65, cela a pris des mois de travail, sept jours semaine, 10-12 heures par jour, à une douzaine d'ingénieurs pour créer ce petit radio. Apart des résistances, il fallait tout innover. Soit dit en passant, il manque une pièce dans le radio sur la photo de la p.65, je vous laisse le soin de l'identifier.

L'article suivant vient de PF Reporter, Jan. 1955. Cette fois, c'est le point de vue du technicien qui prédomine. L'auteur a eu la chance de visiter la chaine de production, en prenant connaissance de chaque étape. Si la deuxième page de l'article semble rétrécie, c'est qu'elle est composée de colonnes venant de 4 pages différentes.

Un petit radio "de poche" à quatre transistors donne des performances à peine acceptable, c'est une curiosite historique, tout au plus. Plusieurs années plus tard, Zenith a sorti la série des "Royal 500" dont les performances sont exemplaires. Cependant, il fallait payer $75 en 1957 pour ce radio petit format à 7 transistors.

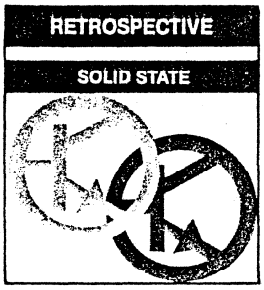
La dernière page vient encore de l'Internet. La venue de Sony sur le marché Nord-Américain en 1955 réflète l'évolution rapide des Japonais. N'oublions pas que Sony était un petit joueur à ce moment là.

Le Regency TR-1 se vendait $50 en 1955, soit environ une semaine de salaire. Aujourd'hui, un radio semblable AM-FM fait en Chine se vend $10, soit près d'une heure de salaire.

Jos Mathews.

The secret six-month project

Why Texas Instruments decided to put the first transistor radio on the market by Christmas 1954 and how it was accomplished



On a steamy day shortly before the July 4 weekend in 1954, Richard Koch and his boss, Raymond Morris, boarded an American Airlines flight from Chicago to Houston, Texas. Morris, who was chief engineer at an Indianapolis, Ind., electronics manufacturer called IDEA (Industrial Development Engineering Associates), had told Koch they were simply going to change some parts in UHF converters stocked at IDEA's Texas distributors. But soon after takeoff, Morris settled back and revealed the main purpose of their trip. After stopping in Houston, they would meet with Texas Instruments (TI) engineers in Dallas to begin manufacturing an all-transistor, shirt-pocket radio. This would be the first commercial transistor radio, and at a time when one could buy a table model vacuum-tube radio for $15, it would sell for $49.95.

The radio project had been conceived at TI in the strictest secrecy and this was actually the first Koch had heard about anyone trying to build such a radio. Indeed, he had never even held a transistor in his hand, for in 1954 the only commercial application of the seven-year-old Bell Laboratories invention was in hearing aids.

Another thing Koch didn't know was that the radio was principally a means to a bigger end for TI. The project was part of a carefully thought-out plan for turning TI—a small manufacturer of geophysical and military equipment in 1949, when the strategy was first devised—into a "good, big company." This was defined by TI's chiefs as one netting a profit of about $10 million on $200 million in annual sales. In 1949 TI, then Geophysical Service Inc., netted $263 000 on $5.8 million in sales. By 1954, TI was a bit more than one-tenth of its way toward its goal, with net income of $1.2 million on $24.4 million in sales.

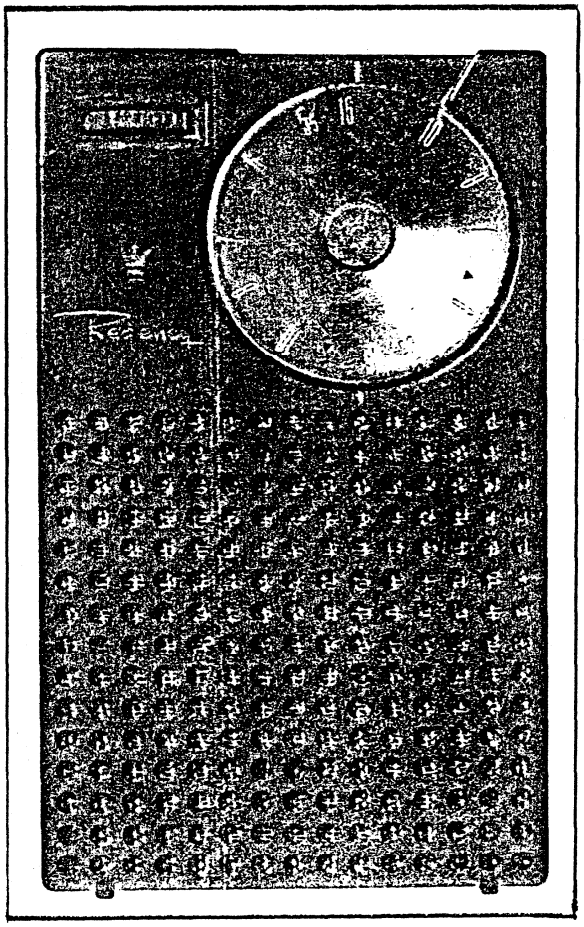
In later years, TI's strategy would be widely cited as a model of technology business planning. It was also a strategy that may well have shaved a couple of years off the time it would otherwise have taken the United States and the rest of the world to shift from vacuum tubes to semiconductors.

Patrick E. Haggerty is a key figure in this story. Haggerty, who was general director and honorary chairman of TI at his death in 1980, was hired by the company in November 1945, shortly after he had left the Navy's Bureau of Aeronautics. He was 31 years old and had received the highest marks that Marquette University had ever given in electrical engineering when he received his B.S. and M.S. degrees there in the mid-1930s.

Upon joining TI, the man whom *Fortune* magazine later called "a star example of the engineering executive breed" was assigned to help the company broaden and diversify through manufactured products. He was made general manager of TI's new laboratory and manufacturing division.

On July 1, 1948, Bell Labs publicly announced the invention of the transistor. Haggerty later wrote that during 1949 and 1950 "it finally became clear to me that the future of electronics would be profoundly influenced by the knowledge already attained and the additional knowledge being rapidly gained about materials at the structure-of-matter level."

Despite the fact that other companies were already researching semiconductors, "not one single hour of effort had gone into research and development on semiconductor devices at TI, nor was there anyone on the payroll, not anyone, who had any previous experience or background in the field," Haggerty noted. He and his colleagues began to make formal plans for developing, manufacturing, and marketing semiconductor devices.



Michael F. Wolff Contributing Editor

This bold strategy—which few similarly situated companies would have dared—required three initial moves: (1) obtaining a transistor patent license from the Bell System; (2) establishing a project engineering group that could grow into a full-fledged operating division to create and market semiconductor devices; and (3) establishing a solid-state research laboratory.

Going for semiconductors

Along with TI's chief engineer, Robert Olsen, and the company's president, J. Erik Jonsson, Haggerty spent most of 1951 in pursuit of the transistor license. The presence of the TI "cowboys" at Bell meetings is said to have evoked surprise and amusement. In 1980, at TI's 25th anniversary observance of the transistor radio and the silicon transistor, Jonsson recalled being told bluntly that Bell doubted TI could succeed in the business. But the Texans persisted (Haggerty took graduate physics courses at night) and in the fall of 1951, when licenses were offered to anyone willing to pay a $25 000 advance on royalties, TI mailed a check the next day.

The following spring Haggerty and three colleagues were invited to the transistor symposium where Bell scientists and engineers told some two dozen licensees what they had learned about making transistors. Immediately upon their return to Dallas, one of the TI representatives, 29-year-old Mark Shepherd, now the company's chairman, was put in charge of developing the devices.

Shepherd's effort got a big boost from the pioneering work that a physical chemist, Gordon Teal, had done at Bell Labs in developing single-crystal germanium and inventing the grown-junction technique of making npn transistors. Drawing on this background, TI engineers were able to develop their own germanium crystal puller and to fabricate point-contact transistors by June 1952, only two months after the Bell symposium. By the end of 1953, Shepherd's group was able to "mass-produce" grown-junction germanium transistors, which then meant turning out batches of a thousand or so.

TI's third move toward becoming a semiconductor powerhouse (today it's the world's largest manufacturer of semiconductors for external sale, according to the market research concern Dataquest Inc.) was taken at the end of 1952 when Teal was hired to start a central research laboratory.

Once these three steps had been taken, the company was ready to begin putting its strategy into practice. Haggerty said later that TI had concluded that semiconductor devices "would be a mass-production business, and we needed soon to find an application which would demand from us relatively large quantities of devices of adequate quality at prices which were economic for the applications involved.

"Too," he added, "it seemed clear that a dramatic accomplishment by Texas Instruments in the field of semiconductors was needed to awaken potential users to the fact that the devices were usable now, not some years in the future, and that we were ready, willing, and able to supply these usable devices."

It was to further this goal that an R&D program to build the all-transistor pocket radio was launched. Simultaneously two other R&D efforts were established—one to produce a commercial silicon transistor and the other to develop a process for producing extremely pure silicon. Both were dramatic successes.

Radios for Christmas

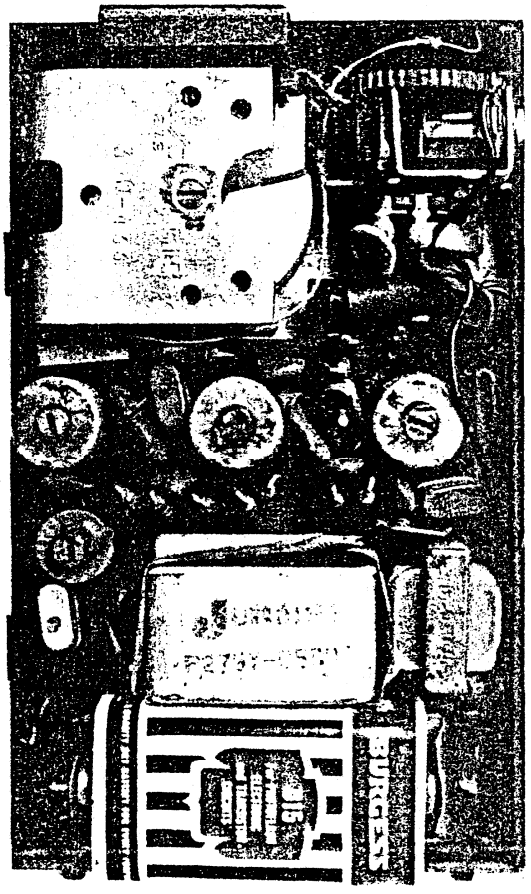
Haggerty, then executive vice president, was convinced that the transistorized radio was feasible, and it was apparently at his instigation that the program got under way in the spring of 1954. He wanted a product out in time for the Christmas market, which meant delivery to dealers in November. This was a tall order for a group that as yet had no experience in transistor circuit design, no transistors capable of operating reliably in a radio circuit, and no facilities for mass-producing such radios.

Yet as one of the engineering team, James Nygaard, told *Spectrum* recently: "Haggerty's foresight, as we learned many times, was absolutely incredible. To us the task looked awesome. But he had enormous faith in people, in what they could achieve."

So began months of seven-day weeks and 10- to 12-hour days for the dozen or so engineers on the project, initially headed by Paul D. Davis Jr., who had designed circuits for a small Dallas radio manufacturer before joining TI. Haggerty stopped by Davis's office one Friday afternoon and asked whether he thought he could build a rough breadboard. Roger Webster recalls that Davis said he could, assuming Haggerty would probably want it in about 30 days.

"However," Webster told *Spectrum*, "when Davis asked Haggerty when he wanted it, the reply was, 'How about next Tuesday?' So we worked day and night to get it built by the following Tuesday, which was quite an achievement, since we had hardly seen a transistor before."

The breadboard had eight transistors and was assembled simply to demonstrate feasibility. Webster was then asked to turn it into something practical, which meant, among other things, cut-



Keith Lovell & Assoc. (photos)

The molded plastic case of the Regency TR-1 radio, shown actual size, was designed to fit into the pocket of a man's dress shirt. The specially designed miniature components barely fit inside the 5-by-3-by-1¼-inch case. In early sets, a small dimple had to be molded inside the case to provide clearance for a set screw for the tuning-capacitor shaft. The four transistors, discrete resistors, capacitors, and other miniaturized components were mounted, along with the 2¾-inch speaker, in the front half of the plastic case. The tuning capacitor was developed by the Radio Condenser Co. and the intermediate-frequency transformer by the Vokar Corp. Chicago Telephone Supply Corp. produced the volume control, and Centralab supplied small ceramic capacitors.

ting the number of transistors in the radio.

Webster was a lifelong "electronicker" who had built ham radios as a boy. After receiving a BSEE degree from the University of California in 1943, he worked at Harvard University's Radio Research Laboratory and then during World War II on the atomic bomb detonation mechanism. He joined TI in 1951, and because his war work had made him one of the few people with RF circuit experience, he was put in charge of the radio circuit design team.

By April 1954, Teal's laboratory had produced its first grown-junction silicon transistor. Webster's group put five in a radio that, he recalled recently, "just played up a storm." But at $100 per transistor, it was clear why Haggerty said after seeing the radio, "Well, Roger, maybe someday silicon, but not now."

Consequently Webster turned to Shepherd's germanium transistors, despite their lower high-frequency gain. Nygaard recalls that the transistors proved to be their biggest challenge. First, in contrast to vacuum tubes, transistors were power-gain devices with which neither TI's engineers nor the authors of their reference books had had any experience. Second, with germanium transistors still far from perfect, the engineers were forced to design circuits for transistors that were being continually improved and whose electrical characteristics they could not be sure of in advance. Third, at the 262-kilocycle intermediate frequency that had been selected, it was difficult to get more than 20 to 22 decibels of gain from the first transistors.

Nevertheless within a month or so, a six-transistor breadboard was designed, and it worked reasonably well. It consisted of an oscillator-mixer, two intermediate-frequency (IF) stages, a detector, and an audio stage. Everything fitted into the 6¼-by-3-by-1¼-inch case of an Emerson battery-operated tube radio that the engineers had bought.

Looking for a manufacturer

Now all TI had to do was find someone to mass-produce and distribute a 5-by-3-by-1¼-inch transistor model by November. This size would fit the pocket of a man's quality dress shirt, although not the slightly smaller pockets of cheaper shirts.

Finding a manufacturer was a job that fell logically to Haggerty and his wartime Navy friend S.T. ("Buddy") Harris. Haggerty hired Harris in 1949 to be TI's first marketing director, a job that Harris pretty much had to define for himself. Once it became clear that the transistor radio was feasible, Harris and Haggerty tried to interest large radio manufacturers.

"I personally contacted every major radio manufacturer in the United States by phone, telegram, or letter and got no encouragement from any of them. Their attitude was wait-and-see," Harris said recently.

One day Haggerty came across a magazine ad from IDEA. The eight-year-old Indianapolis company had been started in a garage by three ex-RCA engineers who wanted to build a new motion picture sound projector. That didn't work out, but when Richard Koch went onto IDEA's payroll in 1951, the company was doing well manufacturing TV boosters. By 1954, however, with that market starting to taper off, the company's president, Edward Tudor, was receptive to new ideas. Haggerty and Harris arranged to meet with him at a trade show in Chicago in May. It wasn't long before an agreement was reached for IDEA's Regency Division to manufacture the radio with transistors bought from TI. Harris would coordinate the overall project, and Koch would be Regency's designer for the radio.

Why Koch? Possibly, as he said recently, "because I'm not afraid of anything new." Koch credits the broad foundation in electrical engineering that he received at Cornell University before World War II with enabling him to excel in "what I call SHOE—school of hands-on experience."

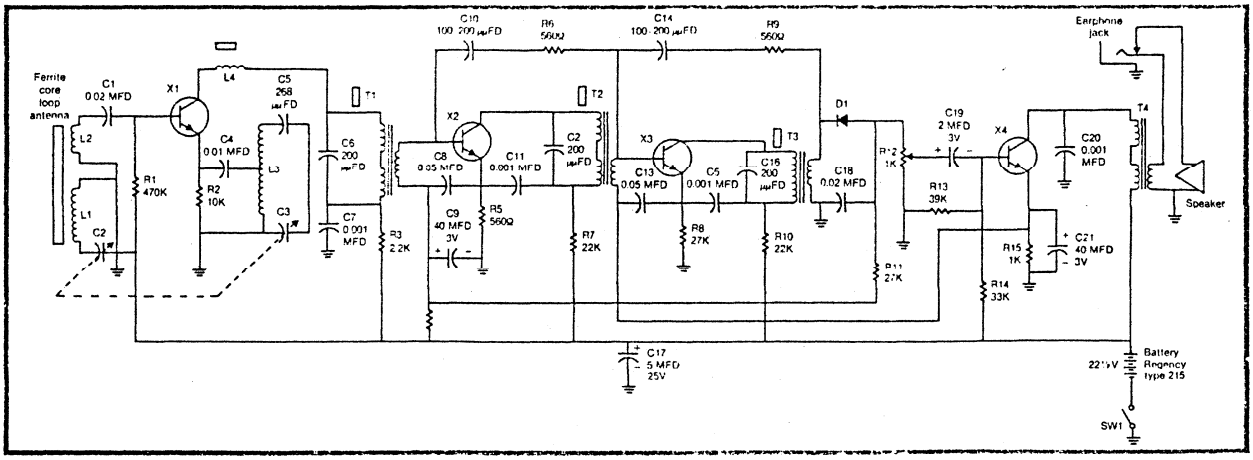
Floyd Hayhurst, who worked closely with Koch at Regency, calls him "one fantastic engineer—the type of fellow who if you assign him to a project, time means nothing; he gets in with both feet and obstacles mean nothing...he is going to find a way to solve all problems."

Koch was another long-time electronicker, receiving a telephone lineman's belt when he was seven years old and "living out of a junk box" as a teenager. At Regency, his TV booster work gave him experience with operating vacuum tubes at 200 megacycles, where the input impedance at the grid was close to the impedance of the transistor stages he would be dealing with in the new radio.

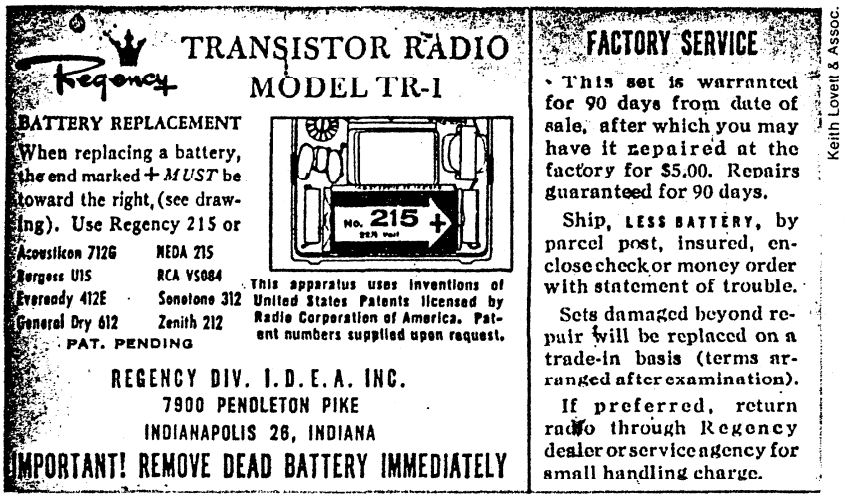
"So interfacing into low-impedance inputs and relatively low-impedance outputs was nothing new to me," he said. "My vacuum-tube experience was almost parallel to what I ran into with transistors."

Taking the nickels out

Koch saw his first transistor when he and Ray Morris examined Webster's breadboard at the meeting in Dallas in July 1954. Koch recalls that his assignment was to package a production radio in the limited space and "take the nickels out" so it could retail for $49.95. Koch took the first nickel out immediately by suggesting replacement of the detector transistor with a germanium diode. He and Webster tried it and found the circuit worked just as well. Now they had a five-transistor design, but their work had only begun. Since transistors represented about one-half the manufacturing cost, Koch knew he had to get rid of still another transistor if he was going to reach the target price. It wasn't obvious how to do that.



Schematic diagram for the production-model TR-1 shows four npn transistors, down from five that were needed in an earlier developmental circuit. To accomplish the reduction, separate oscillator and mixer stages were replaced by a single converter stage.



Regency TRANSISTOR RADIO
MODEL TR-1

BATTERY REPLACEMENT

When replacing a battery, the end marked + *MUST* be toward the right, (see drawing). Use Regency 215 or

Acoustikon 712G	NEDA 215
Burgess U1S	RCA VS084
Eveready 412E	Sonotone 312
General Dry 612	Zenith 212

PAT. PENDING

This apparatus uses inventions of United States Patents licensed by Radio Corporation of America. Patent numbers supplied upon request.

REGENCY DIV. I.D.E.A. INC.
7900 PENDLETON PIKE
INDIANAPOLIS 26, INDIANA

IMPORTANT! REMOVE DEAD BATTERY IMMEDIATELY

FACTORY SERVICE

This set is warranted for 90 days from date of sale, after which you may have it repaired at the factory for $5.00. Repairs guaranteed for 90 days.

Ship, LESS BATTERY, by parcel post, insured, enclose check or money order with statement of trouble.

Sets damaged beyond repair will be replaced on a trade-in basis (terms arranged after examination).

If preferred, return radio through Regency dealer or service agency for small handling charge.

Keith Lovett & Assoc.

A notice inside the back cover of the TR-1 radio cited a 90-day warranty and offered factory repair after that period for a flat fee of $5. A separate flier informed the buyer about the use of the Conelrad frequencies "in the event of an enemy attack."

Koch took the breadboard and schematics back to Indianapolis after the July 4 weekend and began pondering the problem. Driving home one night it suddenly occurred to him that he could combine the separate oscillator and mixer stages into a one-transistor converter stage that would produce the 262-kilocycle IF by mixing the oscillator and RF signals the same way superheterodyne vacuum-tube radio receivers do. This invention, for which Koch received a patent in 1959, illustrates the way he works: "I have always found that when I get into a problem, I walk away and leave it, and when I come back it's solved."

Soon afterward Koch devised a scheme for biasing the IF stages with the bias voltage that was already available in the audio output circuit. His biasing circuit, for which he also received a patent, eliminated several resistors. It also cut the current drain from the 22½-volt hearing-aid battery to 4 milliamperes, giving the battery a life expectancy of 20 to 30 hours.

Regency's agreement with TI called for production prototype radios by Oct. 31, 1954, so actual production could begin in November. While Mark Shepherd and his team in Dallas strove to improve transistor quality, Koch and a few others at Regency tackled the two other major problems: designing the radio package to slip into a shirt pocket and finding sources to make the other circuit components small enough to fit inside the case.

A Chicago industrial design company created one design for the plastic case, and then a second after Koch determined the first one wouldn't hold everything and still be small enough. Koch struggled with the mechanical configuration of the chassis, since each component had to have the "unreasonably close" tolerance of ±0.005 inch. Throughout the long summer, however, he says he remained confident that everything would come together by October. "I didn't have time to get scared—I think if I had gotten scared, I wouldn't have been able to do it," he said recently.

But will it fit?

There was one day that Koch did worry, however. That was toward the end of October when the molding dies for the plastic case were due. Only then would he learn definitely whether the chassis would fit inside, making possible the start of production by Nov. 1, as scheduled. Floyd Hayhurst, who was Regency's purchasing agent as well as assistant to IDEA President Tudor, remembers that the schedule was so tight he drove to the die-maker's Chicago plant, waited for him to finish the dies, loaded them in the trunk of his car, and drove back to Indianapolis "with my headlights pointing halfway up into the sky because my springs couldn't really hold that weight in the back end." When Hayhurst pulled into the molding shop in Indianapolis around 2 a.m., Koch was waiting with a built-up chassis. The dies were unloaded and set up, and a few cases were molded. Koch grabbed one, inserted the chassis, and breathed a sigh of relief when it fit. Now he had a radio and could go home for a good sleep.

Many of the problems came in finding the necessary miniature components. As Koch pointed out recently, resistors were the only standard miniature components one could buy off the shelf in those days. Everything else had to be specially designed. Then the Regency people, aided by Harris, had to scour the country for companies that could manufacture them. "Most of the components just had never been manufactured, because nobody ever dreamed of making anything that small," Hayhurst recalls.

Regency had to wind its own low-impedance antenna coils, as well as design a novel battery switch for the miniature volume control when the control's supplier found itself unable to do so. And because the manufacturer of the compact two-section variable tuning capacitor had no previous experience with forming a 15/16-inch-wide condenser frame, a set screw had to be added to permit adjusting the tension on the condenser shaft. Spacing within the plastic case was so tight that a small depression had to be molded inside so there would be clearance for the top of the screw. (After the radio went into production, the experience that was gained permitted elimination of the adjustment and the depression.)

The miniature electrolytic capacitors were another stumbling block. Eventually a college professor was found in Nashville, Tenn., who was willing to set up a small company to make them in quantity.

Harris recalls that it was a continuing battle to avoid compromising on component—and hence radio—size. "We had a hell of a fight with the 2¾-inch speaker, for example, because nobody had ever made one that size that worked."

Tudor summed it up at the 1980 anniversary observance by saying, "You may be surprised to know that the Regency radio triggered the miniature discrete components market. Because while now we can go out and buy all sorts of things in a variety of choices and sources, in those days there were no miniature tuning condensers, no miniature electrolytic capacitors, no miniature IF transformers, no miniature speakers, and the list goes on and on. Every one of those things had to be created or invented by the people who made it."

Into production

As soon as the new radio was announced publicly on Oct. 18, 1954, Regency's factory people were told they would be manufacturing the radios. To prepare them, one of the first things Koch did, as he puts it, "was to spread a rumor that there was no such thing as a bad transistor." Koch didn't want the factory test people troubleshooting the radio as they would a conventional one—by immediately replacing tubes when a set didn't work. That would have been disastrous with transistors soldered onto circuit boards. Of course, there were defective transistors, but

Koch's strategy succeeded in requiring the technicians to make certain a transistor was bad before replacing it.

Not surprising for such a new technology, board failure rates were as high as 50 percent at the start. On the basis of his experience, as well as intuition, Koch says he soothed frayed nerves at TI by assuring the worriers that this figure could be brought down to 12 to 15 percent as soon as manufacturing and test procedures were smoothed out. He turned out to be right, but it took some doing.

To a considerable extent, of course, this improvement was due to the continued improvements in the transistors that Mark Shepherd's group was turning out at TI. Their challenge was to develop a crystal puller that would provide the right combination of pull rate, temperature, and other parameters to turn out npn-grown junction transistors regularly with adequate gain and other characteristics. By the time the first radio, the TR-1, went into production, the overall gain was 110 dB.

Approximately a year later, sets with pnp transistors were being produced, followed in late 1955 by the TR-6. This was a 7-by-5-by-3-inch-set, complete with a leather carrying case, that used a 9-volt battery, a 5-inch speaker of good quality, and a push-pull audio output stage. Koch and an associate designed it in about an hour one afternoon, which may well have set some kind of record.

The TR-1 arrived on the market in time for Christmas 1954 amidst a flurry of enthusiastic newspaper articles and ads. Weighing less than 12 ounces and indeed fitting into a man's shirt or jacket pocket, it was photographed next to a tea cup for the cover of the December 1954 *I.R.E. Proceedings*. Newspaper and radio writers made the obvious comparison with Dick Tracy's famous wristwatch radio. Typical of the "gee-whiz" response was the magazine writer who exclaimed, "Just picture yourself at the ballgame if you draw a seat out in left field, getting the blow-by-blow from your hankie pocket."

The new radio was an instant sales success. Introduced first in New York City and Los Angeles, it was so popular that the tiny radios began showing up on the black market in other cities. Approximately 100 000 were sold during the first year.

No one recalls the exact number that were manufactured before Regency stopped selling them several years later. However, during that time it was a major product for Regency, accounting for roughly one-half its sales, according to Tudor.

The impact on the industry

As for TI, the radio R&D program, together with the two other R&D programs involving silicon and the silicon transistor, ultimately produced just the dramatic impact on the industry that Haggerty had hoped for. Writing in a 1966 issue of *Research Management*, he observed that from 1952 through 1955, TI's accumulated loss for the total program—all costs including R&D, less income generated—was $1.25 million. In addition TI committed assets of $3 million in plant and equipment, a large proportion of which would have been lost had the strategy failed. This was a lot of money for a company whose sales were $20.5 million in 1952 and $28.7 million in 1955 and whose aftertax profits were $900 000 in 1952 and $1.6 million in 1955.

"On the other hand," Haggerty wrote, "the $1.25 million plus the $3 million in assets was very modest compared to the impact that the strategy could have on the company if it were successful. The strategy was successful, and in 1956 our profits in the semiconductor field were sufficient to generate a satisfactory accumulative profit for the entire program. Further, we were off to a good lead in the semiconductor industry, and our semiconductor products division was to be the bellwether in leading the entire company to our net-sales-billed goal of $200 million per year, which we reached in 1960."

One way in which the TR-1 contributed to reaching the target that TI had set in 1949 was through the decision by Thomas J. Watson Jr. around 1955 to buy a few hundred radios and distribute them among IBM's key executives. A transistor develop-

Transistor radio race produced more than one winner

While Texas Instruments and the Regency Division of IDEA were going all out to complete the TR-1 transistor pocket radio in time for the Christmas 1954 market, the two companies were also in a very close race to be first with any commercial transistor radio. RCA and several other electronics companies had shown working models of radios using six to eight transistors, but the cost apparently had inhibited them from going into commercial production.

Raytheon, however, had been producing relatively large quantities of germanium transistors for hearing aids since 1951, and it saw a market for radios. Unknown to Regency's design engineer, Richard Koch, Raytheon was working on a six-transistor portable radio when he telephoned the company for data on its diode, which he wanted to use in place of a sixth detector transistor. (Koch says he led Raytheon to believe he was working on an FM table radio).

Raytheon came out with a $79.95 transistor radio in February 1955. It was a six-transistor superheterodyne receiver with push-pull output, using four D batteries, and weighing 4½ pounds, against 12 ounces for the Regency TR-1. Today Henry Argento, who was general manager of Raytheon's radio and TV manufacturing operation, calls the TR-1 a "novelty" and describes Raytheon's product as "the first decent transistor radio." He recalls that demand was so great Raytheon "couldn't make enough of them."

Norman Krim, who headed Raytheon's transistor operation at the time, estimates that several tens of thousands of radios were sold before Raytheon discontinued manufacturing them in 1956. Not too long ago Krim proudly played one of the radios for *Spectrum* after it had lain in his basement for 20 years. (At the 1980 anniversary ceremony in Dallas, Buddy Harris, of Texas Instruments, played the first TR-1 to come off the production line.)

While Regency and Raytheon were selling their radios, however, the Japanese were getting ready to take over the market. In 1946 Masaru Ibuka, an engineer, and a young physicist friend, Akio Morita, started the Tokyo Telecommunications Engineering Corp. with a handful of employees in a bombed-out Tokyo department store. From the time he had first thought of starting an engineering business, Ibuka had wanted to be in the consumer field, but he realized that to be successful his company would have to do something no other company had done before. That chance came in 1952.

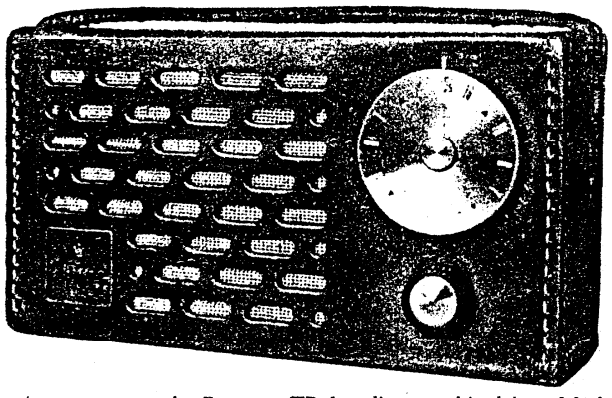
On a three-month trip to the United States, Ibuka learned from a Japanese friend that the Bell System was about to license its transistor patent. Although Ibuka was aware of the transistor's scientific importance, he reportedly did not see any direct application to his company, which by then was making a name for itself manufacturing tape recorders. Nevertheless he was anxious to find a project that would engage the minds of his growing cadre of skilled engineers.

When he returned to Tokyo, a colleague remembers, Ibuka said: "Radios. We're going to use this transistor to make radios—small enough so each individual will be able to carry them around for his use, with power that will enable civilization to reach even those areas that have no electric power yet."

However, the $25 000 that the Bell System wanted as an advance against royalties was a lot for the small company, Tokyo Telecommunications, which then had about 500 employees. It was also a considerable sum to be approved by the Japanese government's Ministry of International Trade and Industry (MITI), which was concerned about currency exchange.

In 1953, Morita signed a provisional agreement with the Bell System and while in the United States, he also collected every

ment program was established at IBM in 1950 and led to a commercial all-transistor calculator being shipped in December 1957. Nevertheless, Watson recalled recently: "Our people had barely learned how to handle electrons in the tube, and [the transistor] invention shocked them. It was something they pulled back from. I used to go up to the lab and say, 'Why not transistors?' Finally, Al [Williams] and I wrote a memorandum that said, 'After June 1, 1958, we will build no more machines with electron tubes. Signed Tom Watson Jr.' They were awful mad and said, 'What the hell does he know about it?' But I kept giving them transistor radios. Every time they'd complain, I'd pass them a transistor radio."



Keith Lovell & Assoc.

A successor to the Regency TR-1 radio was this deluxe Model TR-5. Clearly not designed to fit a shirt pocket, the top-grain cowhide case measured 6¾ by 3⅜ by 2 1/16 inches. Its chassis, too, was larger than that of the TR-1.

The transistor radio also led to an important licensing agreement with TI. As Haggerty said in 1980, "Mark [Shepherd] and I had been trying to sell IBM on TI as a supplier of transistors for what was obviously going to be one of the great needs of the computer and we had not been succeeding." Finally, he said, "in December 1957 we signed the agreement with IBM that resulted in our supplying a very large percentage of their requirements for many, many years." Haggerty added that Jim Birkenstock, who was handling licensing for IBM, had told him the supply agreement was the result of Watson's spreading the radios around in 1955 and, later, saying, "If that little outfit down in Texas can make these radios work for this kind of money, they can make transistors that will make our computers work, too."

Haggerty was also convinced, as he wrote in 1966, "that the entire cycle of the utilization of semiconductor devices in the United States and the world was speeded up by at least two years because one then-relatively-small company chose the proper strategy and followed through with successful tactics."

There was one regret, though. In hindsight, Haggerty and Harris concluded that the radio had been priced too low. Haggerty admitted in his 1980 speech that they had made a serious strategic mistake by heeding warnings from "everybody we talked to" to hold the price below $50, instead of pricing it at $60 or $65.

"TI and IDEA had an agreement," he went on, "that if we mutually chose, we'd stay in the consumer business. We chose not to stay. I think, however, had we each had the additional hundreds of thousands of dollars that the difference in pricing would have made available—and hence the funds to go on and develop additional products—we probably would have entered jointly or stayed in the consumer business. We would have entered then in 1954 instead of 1971, and I think the likelihood is very high that we would have been the Sony of consumer electronics."

Nevertheless, as Harris reminisced on that celebratory day in 1980, "It was an exciting time full of bravery and naivete, but it changed the world's acceptance of the transistor and did much to launch TI."

book he could on transistor technology. By January 1954, he was able to persuade a skeptical MITI to allow the contract to go through and the payment to be made. MITI officials are said to have wondered why none of the big Japanese electronics companies seemed interested.

Immediately Ibuka and the young geophysicist selected to head the company's transistor team flew to the United States to visit Bell Laboratories and other companies to learn about making transistors. Every night they mailed to Japan a report of what they had learned that day.

In June 1954, Tokyo Telecommunications made its first transistor, and by the year's end had learned to produce transistors that could operate at radio frequencies, although with yields of only 5 percent. When news of the Regency radio reached the Japanese company, it stepped up the pace, and in August 1955 introduced what Keichi Oshima, chairman of a technological research and consulting company, Technova Inc., has called "the first successful transistor radio in Japan." Its brand name was Sony, which became the new name of Tokyo Telecommunications in 1957.

The first Sony transistor radio was too big to fit into a shirt pocket, and the next two years were spent persuading component suppliers to miniaturize their products, as TI and Regency had to do in the United States. By March 1957, Sony produced its first pocket transistor radio, of which it sold more than 500 000.

In 1957, Toshiba, Hitachi, and Matsushita radios came on the market. By 1959, 80 percent of Japan's radio production was transistorized and three-fourths of the output was being exported, according to Oshima. It wasn't long before the Japanese had captured the world radio market and had laid the groundwork for their subsequent dominance in consumer electronics. —*M.F.W.*

To probe further

Several of the recollections cited in this article are elaborated on in the papers presented at the 25th Anniversary Observance of the Transistor Radio and Silicon Transistor, held at Texas Instruments on March 17, 1980. The papers may be obtained, while supplies last, from Texas Instruments, P.O. Box 225474, Dallas, Texas 75265.

For more on TI and Haggerty's strategic thinking in those days, see: "The Men Who Made T.I." and "Where Texas Instruments Goes from Here," *Fortune*, November 1961 and December 1961, respectively; Haggerty's short paper "Strategies, Tactics, and Research," *Research Management*, No. 3, 1966; and David Allison's "The Management Style of Patrick Haggerty," *Innovation*, No. 8, 1969.

For more on the Japanese role in transistor radios, see Nick Lyons' *The Sony Vision* (New York: Crown Publishers, 1976) and Keichi Oshima's "Technological innovation and industrial research in Japan," *Research Policy*, October 1984.

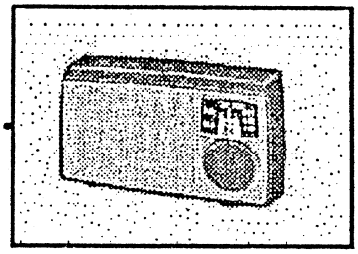
Tom Watson Jr.'s account of giving his people transistor radios can be found in Harry Levinson and Stuart Rosenthal's *CEO: Corporate Leadership in Action*, pp. 201-02 (New York: Basic Books, 1984).

IBM's transistor development program is discussed in Emerson W. Pugh's *Memories That Shaped an Industry* (MIT Press, 1984). The transistor program is also covered in considerable detail in *IBM's Early Computers*, by C.J. Bashe, L.R. Johnson, J.H. Palmer, and E.W. Pugh, scheduled for publication this month. This new book gives an account of Watson's decision to halt production of vacuum tube machines that is somewhat different from his recollection in *CEO*. ◆

The author wishes to acknowledge especially the help of Ross Smith, assistant director of the CTS-Turner Museum in Elkhart, Ind., whose research on the Regency radio provided the impetus for this article.

Reprint

SONY TRANSISTOR RADIOS

--TR-55..  ..1955--

The Sony TR-55 was the first transistor radio marketed by the little Japanese firm of "Tokyo Tsushin Kogyo Kabushi Kaisha"... or Totsuko for short. Totsuko had been around since 1946, failing with its first product, an electric rice cooker, but finding success with a tape recorder.

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In 1951, Totsuko was among the brave firms eager to plunk down $25,000 to buy a license from AT&T to manufacture transistors, which had been invented by scientists at Bell Labs in 1948 (a Nobel Prize-winning achievement).

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The transistors would find their way into Japan's first transistor radio. It was ready in April, 1955... the model TR-52. By June, however, it was discovered that all the plastic grilles on the radios then made had WARPED! Fortunately only 100 or so units are said to have been finished, so the company halted their production and beefed up quality on the line. In August, the TR-55 was ready for market.

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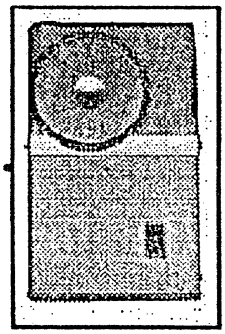
Tokyo Tsushin Kogyo Kabushi Kaisha was a rather awkward name to put on the radio, so the company came up with "SONY" as its new brand name. Several of SONY's early models, however, still also bear the name "Tokyo Tsushin Kogyo Limited."

--TR-63..  ..1957--

The Sony TR-55 was sold mostly in Japan, although it is thought it was exported to Canada, and may have been sold on a limited basis in New York City. But the coat-pocket-sized radio didn't set the market aflame. Sony decided it needed a shirt-pocket-size model, and so it created the TR-63. To be honest, the TR-63 is too bulky for a shirt pocket, but Sony cleverly gave its salesmen shirts with special large pockets to accomodate the radios and pave the way for sales.

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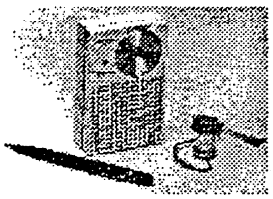
In 1957, then, the Sony TR-63 became the first Japanese transistor radio to be exported to the U.S. The tide of Japanese products that followed is well-known.

Reprint

TEXAS INSTRUMENTS

First Commercial Transistor Radio



TI Supplying Transistors for First "Pocket Size" Radio

Information Bulletin

DALLAS, Texas, October 18, 1954 - TI's part in the production of the first commercial transistorized radio receiver will be announced beginning today in newspapers throughout the country.

The "pocket size" radio has four TI transistors. It also uses a TI subminiature output transformer.

The transistors - technically known as n-p-n grown junction germanium triodes - are made in the Semiconductor Products Division. The transformer is a product of the Components Division.

Their application to the new radio receiver accounts for a large part of the increased production and employment in the two divisions in recent weeks. The Apparatus Division has also had a hand in the tiny radio, having worked on engineering problems and the machining and fabricating of models for the plastic case.

The receiver is being assembled and marketed by the Regency Division of Industrial Development Engineering Associates, Inc., Indianapolis. It will be available this week to the public through sales outlets in Los Angeles and New York City. When production permits, it will be sold in cities throughout the country. For competitive reasons it was decided to keep the development of the radio, including TI's part in it, "under wraps" until the unit was ready for marketing.

The radio receiver measures 5 x 3 x 1 1/4 inches - the smallest set commercially available - with the semiconductor devices themselves occupying less than 1/10 of a cubic inch. The "pocket size" is a significant achievement since it includes a high fidelity, high volume speaker and a single battery supply as well as all associated receiver circuit components.

Gain at radio frequency with the germanium transistor is sufficient to permit a combined mixer-oscillator stage. Only two intermediate frequency stages are required and, following a germanium diode detector, one audio amplifier stage. Audio volume fidelity and reception range are the equal of or superior to that of the small vacuum tube-equipped portable radios.

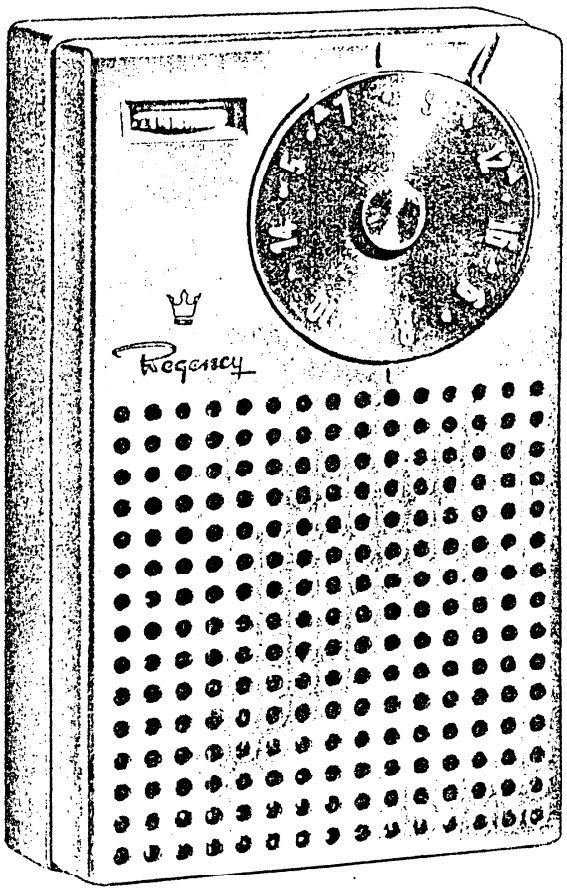
The introduction of this first mass production item to use the tiny transistor to replace the fragile vacuum tube leads the way for the long-predicted transistorization and miniaturization of many other mass production consumer devices. TIers can justly be proud of being the first to produce a high-gain transistor at a cost permitting its application to the high-volume commercial market.

Reprint

TRANSISTOR RADIOS are here

A DESCRIPTION OF THE REGENCY MODEL TR-1 POCKET RADIO

BY WILLIAM E. BURKE



The advent of transistors into the commercial products which the service technician will eventually encounter has been predicted many times in the past several years. The volume production of the first of such items has recently been announced by Regency, a division of Industrial Development Engineering Associates, Inc., (I.D.E.A.) of Indianapolis, Ind. It is the Regency Model TR-1 completely transistorized pocket-sized radio receiver. Four transistors replace the four vacuum tubes commonly found in battery receivers.

Since Regency is located in the vicinity of our company, the author was priviledged in being allowed to examine several of these receivers in detail and in seeing the production line where the receivers are assembled. This article is presented as a preview of the circuitry used in the Model TR-1 so that the service technician can become somewhat familiar with the type of receiver which he may expect to encounter in the future.

General Features

This receiver has been completely transistorized; in addition, it has been miniaturized to the point where it truly is a pocket-sized radio receiver. The dimensions of 5 inches by 3 inches by 1 1/4 inches are small enough so that the receiver conveniently fits into the pocket of a man's shirt. The size of the receiver can be judged from the fact that the picture in the heading of this article shows its actual size. The receiver

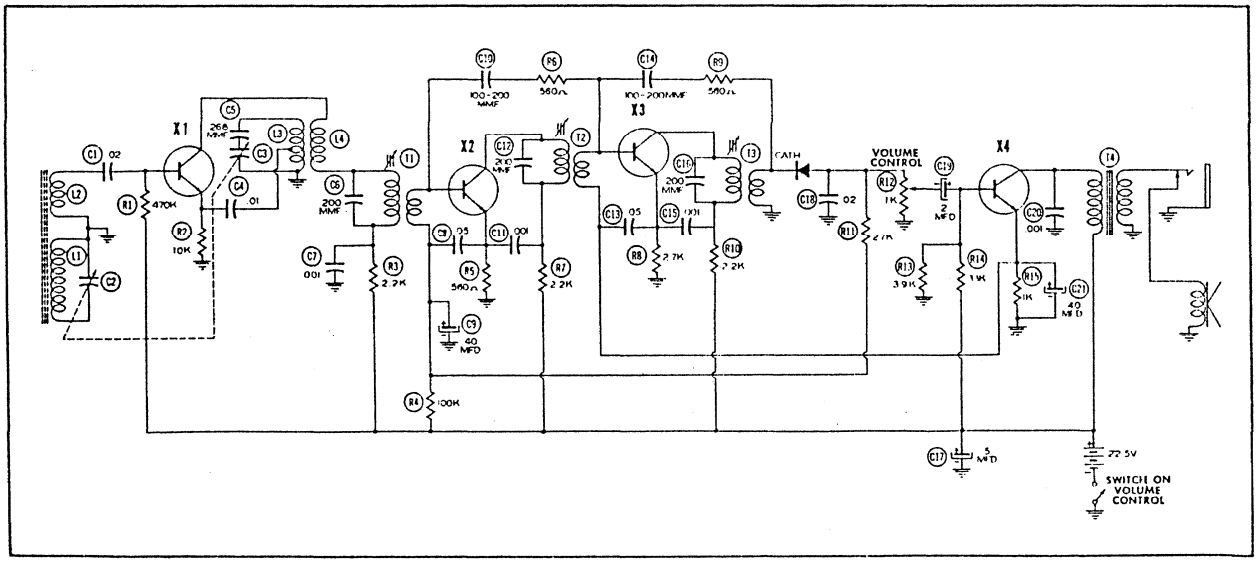


Fig. 1. Schematic of Regency Model TR-1 Pocket-Sized Radio Receiver.

Transistor Radio Is Here

complete with battery weighs only 12 ounces. The case is made of polystyrene plastic and is available in a variety of colors. The schematic of the Model TR-1 is shown in Fig. 1 and should be of real interest.

Technical Features

The assembly process starts with the printed-circuit board shown in Fig. 2. This board serves as the chassis of the receiver. All of the components are mounted on the board, and all connections are soldered simultaneously in one dipping operation.

Converter Stage

The antenna in the Model TR-1 is in the form of a coil which has a ferrite core providing a tuned circuit of high Q. Hand capacitance has very little detuning effect on this coil, and the receiver is not exceptionally directional; these are two good

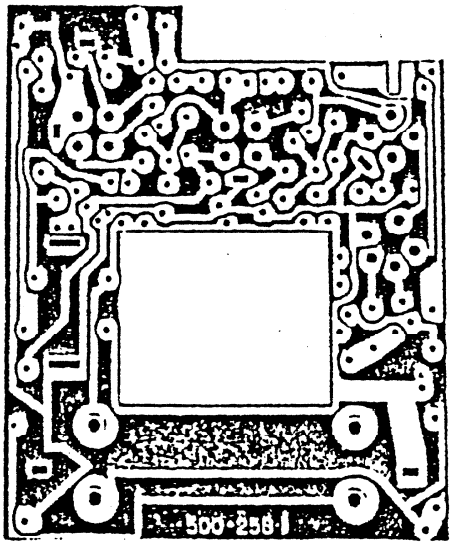


Fig. 2. Printed-Circuit Board Used in the Regency Model TR-1.

features in a portable receiver of such a small size. A low-impedance winding on the antenna coil couples the received signal to the base of the converter transistor. Like the three other transistor stages in the receiver, the converter stage is biased in such a way that the input impedance is low (about 500 ohms).

The oscillator injection voltage is derived from a tuned circuit which is inductively coupled to a coil in the collector circuit. The entire converter stage is similar in operation to the vacuum-tube converter circuit shown in Fig. 3, a circuit which has been used in conventional receivers. As in any superheterodyne receiver, the IF transformer accepts the proper frequency from among the multitude of frequencies in the output circuit of the converter and passes this frequency to the first IF stage.

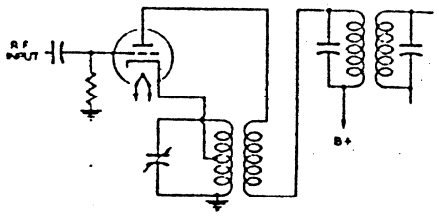


Fig. 3. Equivalent Vacuum-Tube Converter Circuit.

IF Stages

The IF transformers used in this receiver are of the tuned-primary, untuned-secondary type; and they resonate at 262 kc. The secondaries are wound with very few turns so that proper matching to the low input impedances of the IF transistors is obtained. The primary of each transformer is paralleled by a capacitor of fixed value, and variable tuning is accomplished with the threaded iron core.

The two IF stages are almost identical, and they are both connected as grounded-emitter circuits. Since the three-element transistor is the analogue of the triode vacuum tube, and since triodes must be neutralized when they are used at other than audio frequencies, the two IF transistors must also be neturalized in order to prevent stray oscillations. In this receiver, the neutralization of each stage is accomplished by a series capacitor-resistor combination which feeds a portion of the output signal back to the input of the stage.

Only the first IF stage is controlled by AVC. This is derived from the output of the diode detector, is filtered, and is then supplied to the base of the transistor in the first IF stage. When the received signal increases, the negative AVC voltage which is fed back to the base of the first IF transistor increases and reduces the gain of this stage. The opposite condition prevails when the signal strength decreases.

The second IF stage derives its base bias from the emitter of the audio output transistor. The bias resistor in the output-emitter lead is bypassed by a large value of capacitance in order to stabilize the voltage across the resistor. This voltage is further bypassed by an .05-mfd capacitor and is fed to the low side of the secondary of transformer T2. A resistor in the emitter lead of each of the IF transistors develops a voltage which biases the emitter properly.

The diode-detector stage, in which the manufacturer uses either a Raytheon CK706A or a Tungsol TS117 crystal diode, is connected directly to the volume control. The low resistance (1,000 ohms) of this control is necessary for a proper impedance match to the input of the audio transistor.

Output Stage

The output transistor is connected in a grounded-emitter circuit, and bias for the emitter is obtained by a series resistor. Bias for the base is obtained by a voltage divider from the positive line. These two bias arrangements assure that variations in ambient temperature and in battery voltage will not adversely affect the operation of this transistor. The collector impedance of this transistor is approximately 10,000 ohms, a value considerably lower than that which is characteristic of most transistors of this general type.

The output transformer matches the 10,000-ohm impedance of the output transistor to the 12- to 15-ohm impedance of the speaker. The speaker, which is only 2 3/4 inches in diameter, provides reasonable fidelity and volume for so small a unit. A hearing-aid type of earphone is available as accessory equipment for the Model TR-1, and the earphone plug can be inserted into a small jack on the side of the receiver. The speaker is silenced when this plug is inserted into the jack.

Power Supply

The entire power requirements for this receiver are fulfilled by one hearing-aid battery that provides 22.5 volts. The current drain from this battery is only 4 ma when a local station is being received, and the life expectancy of the battery is rated at 20 to 30 hours depending upon frequency and duration of use.

One important fact to remember is that it is physically possible to reverse the battery when inserting it into the clips. Warnings are given about this in the literature accompanying the receiver and inside the receiver case. The transistors will not be harmed by a reversal of battery polarity; but the electrolytic capacitor connected between the positive battery lead and ground will be damaged if the battery is reversed.

A photograph of the receiver shown in Fig. 4 has been included to give a general idea of the way the components have been mounted. Note in particular the small size of the IF transformers, audio output transformer, and the tuning capacitor. The use of these miniature components together with the use of transistors instead of tubes contribute to the compactness of the receiver.

We want to acknowledge the very kind cooperation of the Regency Division of I. D. E. A., Inc., in supplying information for this article and in making it possible for us to view the units in production.

WILLIAM E. BURKE

January, 1955 - PF REPORTER

Spécial Militaire

Chronique Radios militaires

Par André Guibert

N.D.L.R. Le mot radio, est utilisé dans sa forme masculine, tel qu'il est d'usage reconnu par l'office de la langue française au Canada, pour désigner l'appareil, le poste récepteur, etc.

Un collectionneur quel qu'il soit s'étonne au fil des ans de découvrir d'autres types de collection connexes. Les radios dit "domestiques" m'ont intéressé à la fin des années 30. Mais dès 1945, mon intérêt se porta sur les radios militaires, à cause de l'étendue des fréquences disponibles qui permettait la découverte des ondes courtes pour radio amateurs et pays étrangers,et de leur complexité électronique-mécanique.

Au cours des années, j'ai rencontré des collectionneurs de radios "domestiques", et bien entendu parler des nombreux efforts pour les regrouper, et par-dessus tout assurer une continuité qui ne s'était jamais manifestée. La découverte de la Société des Collectionneurs de Radios Anciens Inc. m'a redonné espoir d'où l'idée d'y entrer et d'y déposer mon oeuf, rassurez-vous, ce n'est pas un oeuf de dinosaure.

Chaque hobby possède un vocabulaire et j'en apprend à chaque exposition. En fin de compte j'estime que le collectionneur de radios militaires est "hybride" résultant d'un croisement du "domestique" et de la "radio amateur". Il est vrai qu'il existe aussi maintenant un croisement "domestique-C.B"

Je commencerai donc par l'espèce/modèle d'appareil le plus connu dans le domaine militaire, soit le 19 MK III (Mark 3), également appelé C19 et MK III.

Le 19 est un émetteur-récepteur utilisé surtout dans les blindés (chars d'assaut/véhicules) d'après des spécifications anglaise. Il fut fabriqué en Angleterre, au Canada et aux États-Unis, mais les exemplaires les plus courants ici sont de fabrication canadienne (RCA, Marconi, etc.)

Plusieurs se demandaient quel était l'alphabet ou le langage utilisé en dessous de l'anglais sur les appareils. Lors de la deuxième guerre mondiale, beaucoup de matériel militaire était expédié en Russie, (les Russes étaient nos alliés à l'époque), suite aux accords commerciaux (lend lease), d'où l'alphabet Cyrillique. En ce qui concerne les codes utilisés dans la désignation des appareils voici une explication à retenir:
Lexique:

1- "C" dénote le pays de fabrication, Canada.
2- "19", le numéro de modèle.
3- "MK" (Mark), variante du modèle.
4-"II" et "III", identifie la variante.

Deux gammes de fréquences étaient disponibles, soit pour le groupe "A", de 2 à 8 Mhz (distance jusqu'à 20 milles ou 35 km en phonie -voix-).Le groupe "B", lui, servait pour la liaison entre chars et utilisait les fréquences de 230 à 240 Mhz. Il y avait aussi un amplificateur pour l'intercom, à bord des chars, désigné comme "I/C".

Le problème d'accord avec les antennes de type "fouet", utilisées pour ne pas dénoncer leur position et offrir une cible réduite, était de taille. l'opérateur devait utiliser et ajuster le variomètre, sorte de cylindre fixé sur la source d'alimentation (power supply).

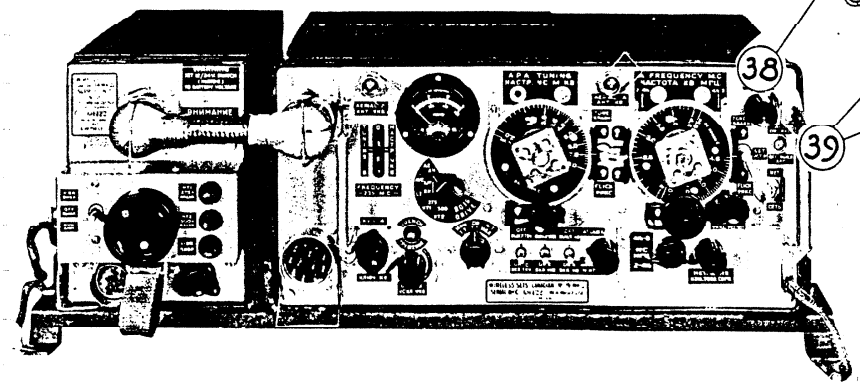
L'alimentation était, soit de 12 volts dc ou de

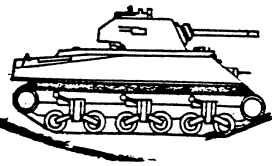
24 volts dc. Un petit moteur électrique /génératrice fournissait les 265 volts dc et les 540 volts dc nécessaires pour les sections "récepteur", "émetteur" et "I/C".

Ces radios furent fabriqués à plusieurs milliers d'exemplaires et le marché du surplus militaire en fut inondé après 1945. Ce type de radio devint rapidement le favori des jeunes radio amateurs durant de nombreuses années. L'auteur de ces lignes se rappelle que c'est avec l'aide d'un "19" qu'un radio amateur avait été capable d'établir le seul lien de communication avec l'extérieur lors de l'incendie de Cabano.

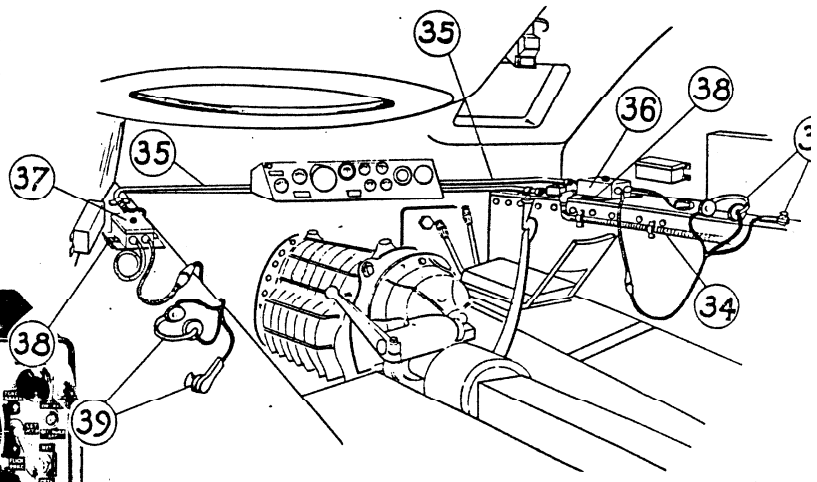
Le 19 MK III est devenu un objet de collection intéressant qui nous rappelle une période de notre histoire et de voir un vétéran de la 2ième guerre, silencieux et pensif devant cet appareil, ne peut que nous laisser songeur nous aussi. L'appareil et le vétéran vieillissent tous les deux et on sait déjà lequel des deux survivra à l'autre.Qui sait, un jour vous pourriez faire un échange avec un collectionneur militaire possédant "la pièce".

Les photos suivantes donnent une idée du modèle et ce qui attend le collectionneur militaire.





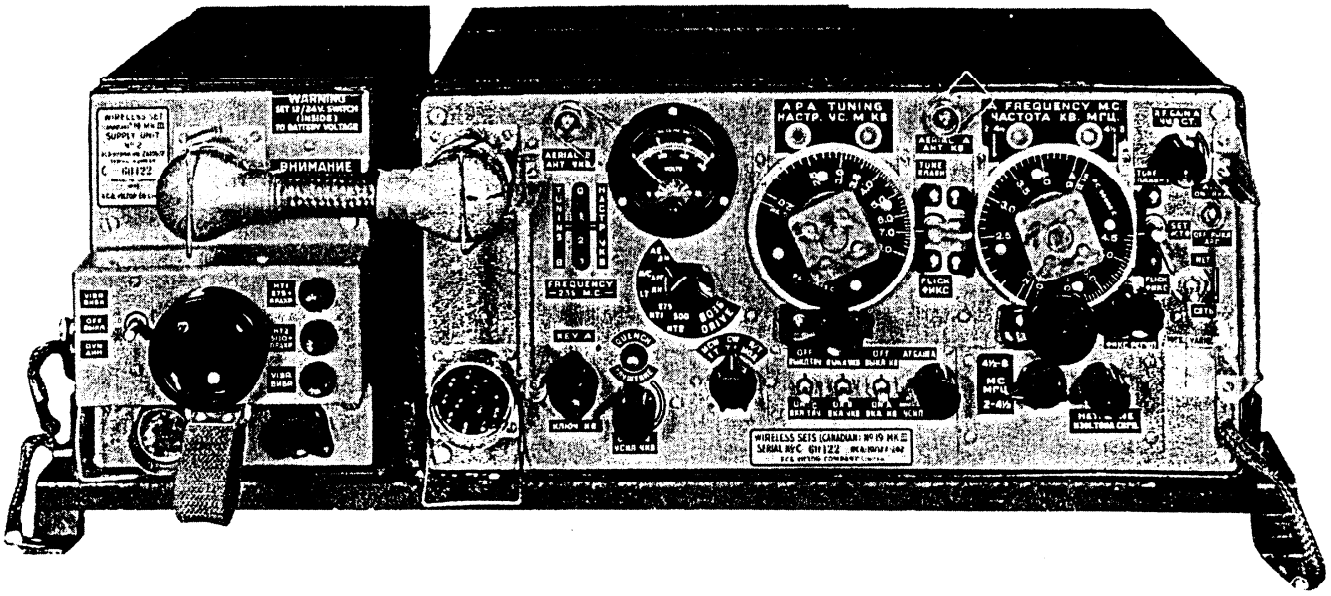
VOUS N'AVEZ PAS DE CHAR D'ASSAUT ?
Ce n'est pas grave...l'information pourrait vous servir un jour....!



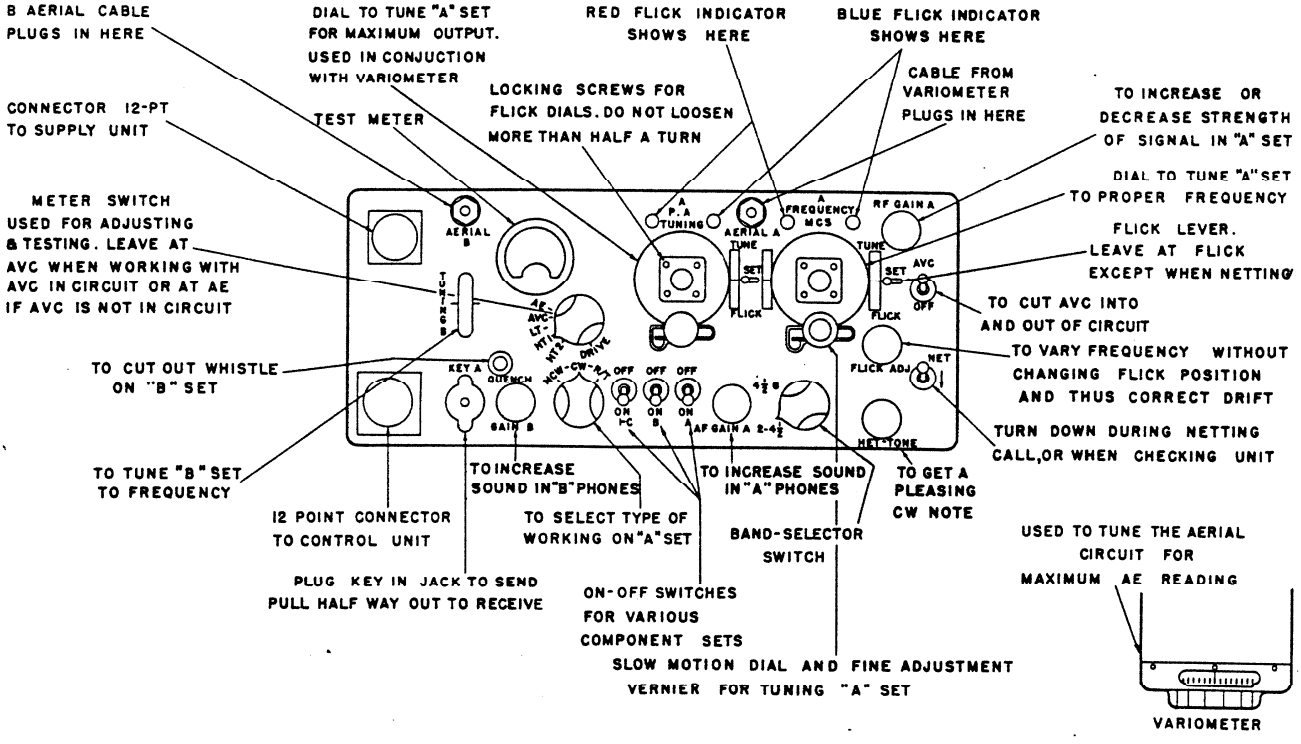
VUE INTÉRIEURE DU CHAR D'ASSAUT

Attention collectionneurs !
Combien vaut aujourd'hui un 19 MK III ? Entre 550.00$ et 600.$ Si vous êtes chanceux,vous pouvez encore en trouver pour moins de 100.$

34 Conduit, Slip Rings to Driver's J. D. No. 3.....
35 Conduit, Driver's J.D. No. 3 to FWD Gunner's J. D. No. 3.....
36 Junction Distribution No. 3 (Driver).....
37 Junction Distribution No. 3 (FWD Gunner).....
38 Tapped Mounting Pads.....
39 Mic. and Rec. Hdgr. No. I.....



19 MK III



WHAT ARE ALL THE KNOBS FOR?

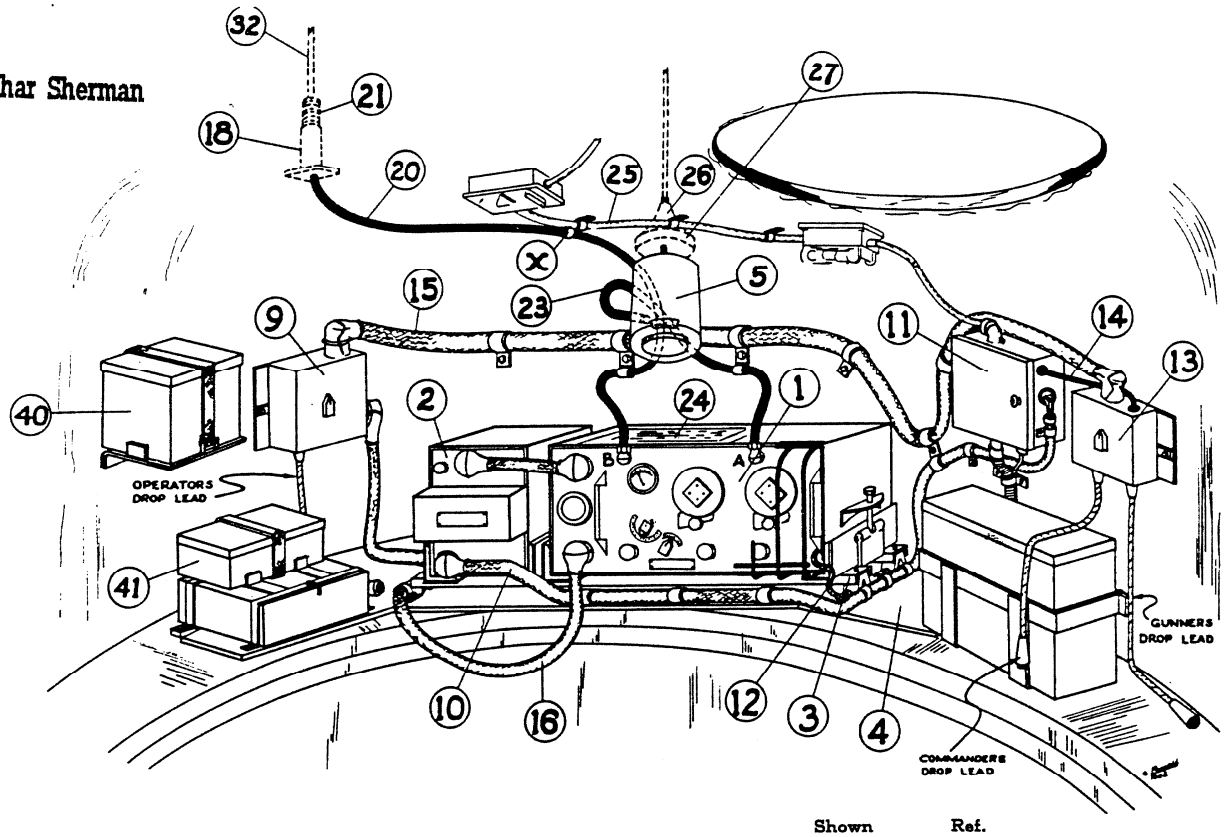
À quoi donc servent tous ces boutons ?

Ces documents sont précieux et ne seront pas réédités.
Conservez-les.
Reproductions permises...

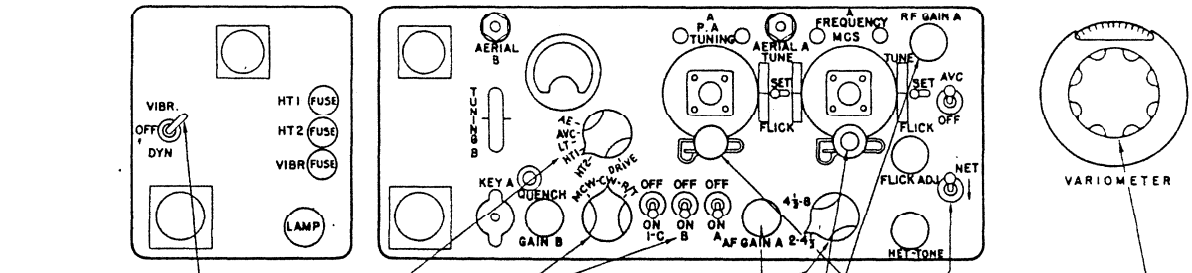
Collectionneur de radios domestiques
versus
Collectionneurs de radios militaires

Radios domestiques	Radios militaires
Petits appareils légers	De 50 à 250 livres
Plus faciles à introduire à la maison.	Essayez donc de rentrer nonchalamment à la maison avec un MK19 III sous le bras....
Couleurs variées.	Deux couleurs. Kaki et bleu océan.
Boîtiers esthétiques	Nos femmes ne voient pas l'âme de notre trésor. Seulement du métal et peut-être un peu de rouille.
Alimentation standard 120 Vac	Pourquoi tant de fils...Tu as peut-être surement trop !
Alimentation silencieuses.	Un "dynamotor" fait un bruit pourtant agréable pour nous...pendant qu'elle regarde la TV. Néanmoins, ce bruit nous attire des remarques sarcastiques et cinglantes..
Environnement de travail agréable	À cause du paragraphe précédent, ...dans la cave ou la remise.
En montre dans des endroits civilisés.	Magasins de surplus (Tu me verra pas là) et ci-dessus mentionné.
On vous traite de collectionneur avec déférence.	"Vous êtes un guenillou de l'électronique" (qualification de Lise Payette lors d'une entrevue à la radio)
Ça doit valoir "cher"....	"Je te mettrais tout ça à la scrap !
C'est une passion	Ça fait rien, c'est passionnant
P/S..On retire l'appareil simplement d'une tablette.	On enlève deux cordes de bois pour sortir un radar de 250 lbs + alimentation de 75 lbs qui serviront à la restauration du destroyer "AIDA" à Toronto.

Char Sherman



Item No.	Description	Shown on Figs.	Ref. No.
1	Sender-Receiver	1	ZA10178
2	Power Supply Unit No. 1	1	ZA 3108
3	Carrier No. 1	1	ZA 3102
4	Adapter Plate	1	.....
5	Variometer	1	ZA10214
6	Aerial Feeder Assembly No. 5	2	ZA 2958
7	Plates, Packing	2	ZA 2948
8	Aerial Base Adapter Box	2	.....
9	Control Unit No. 2	1	ZA 3101
10	Connector 6 Point No. 12 A	1	ZA10281
11	Fuse Box	1	.....
12	Ground Strap	1	.....
13	Control Unit No. I MK II	1	ZA10243
14	Connector Single No. 193	1	.....
15	Connector 12 Point No. 4 C	1,4	ZA10278
16	Connector 12 Point No. 3 B	1,4	ZA 1899
17	Drilled Ring	3	.....
18	Aerial Base No. 9 MTG No. I	1,3,4	ZA 1765
19	Co-Axial Connector	3	.....
20	Leads, Aerial No. 2	1,3,4	ZA 3142
21	Aerial Base No. 9	1,3,4	ZA 1764
22	* 4 BA×1/4 Rd. Hd. M.S.	3	.....
23	Leads Aerial No. I	1,4	ZA 3141
24	Wiring Diagram Plate No. 191	1	.....
25	Wheat Lamp Cable	1	.....
26	Aerial Base No. 8	1,2,4	ZA 1763
27	Aerial Base No. 8 Mounting No. 3	2	ZA 1827
28	Aerial Connector Plate	2	ZA10204
29	Connector Pigtail No. 3	2	ZA 1868
30	Connector Pigtail No. 1	2	.....
31	"F" Aerial Rods	2,4	ZA 0894 ZA 0895 ZA 0896
32	"G" Aerial Rod	1,3,4	ZA 1771
40	Case Spare Valves	1	ZA 3104
41	Case Spare Parts No. 5C	1	ZA 1904



PRELIMINARY

1 TURN "A" ON AND "B" AND "I-C" OFF
2 TURN TO VIBR.
3 TEST LT HT1 AND HT2
4 SELECT FREQUENCY BAND
5 SELECT MCW CW OR R/T
6 PREPARE FLICKS FOR SETTING
7 SET A FREQUENCY MC/S. AND A PA TUNING TO REQUIRED FREQUENCY
8 CENTRE THE FLICK ADJ
9 TURN RF GAIN AND AF GAIN FULLY CLOCKWISE AND ROTATE VARIOMETER FOR MAXIMUM RUSTLE
10 TAKE A DRIVE READING ON METER

DURING TUNING CALL

11 SEARCH BOLDLY FOR CONTROL
12 ADJUST RF GAIN AND AF GAIN

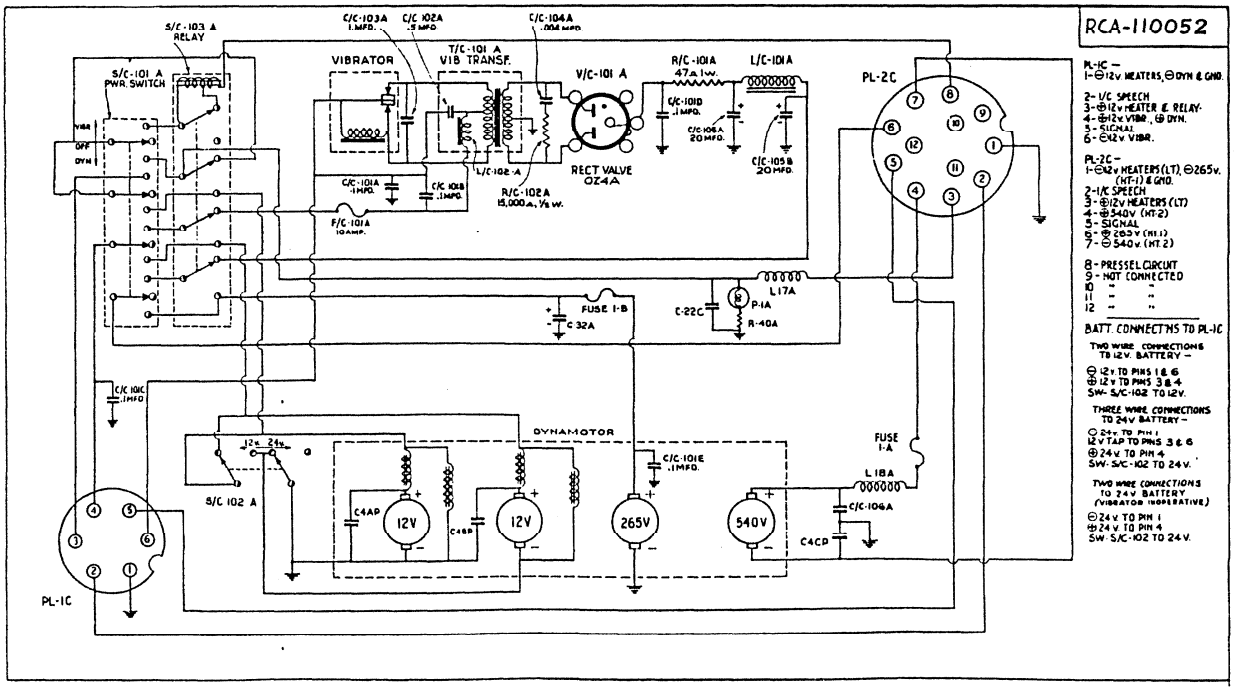
DURING NETTING CALL

13 TURN NET SWITCH DOWN
14 TUNE FOR ZERO BEAT
15 TURN NET SWITCH UP

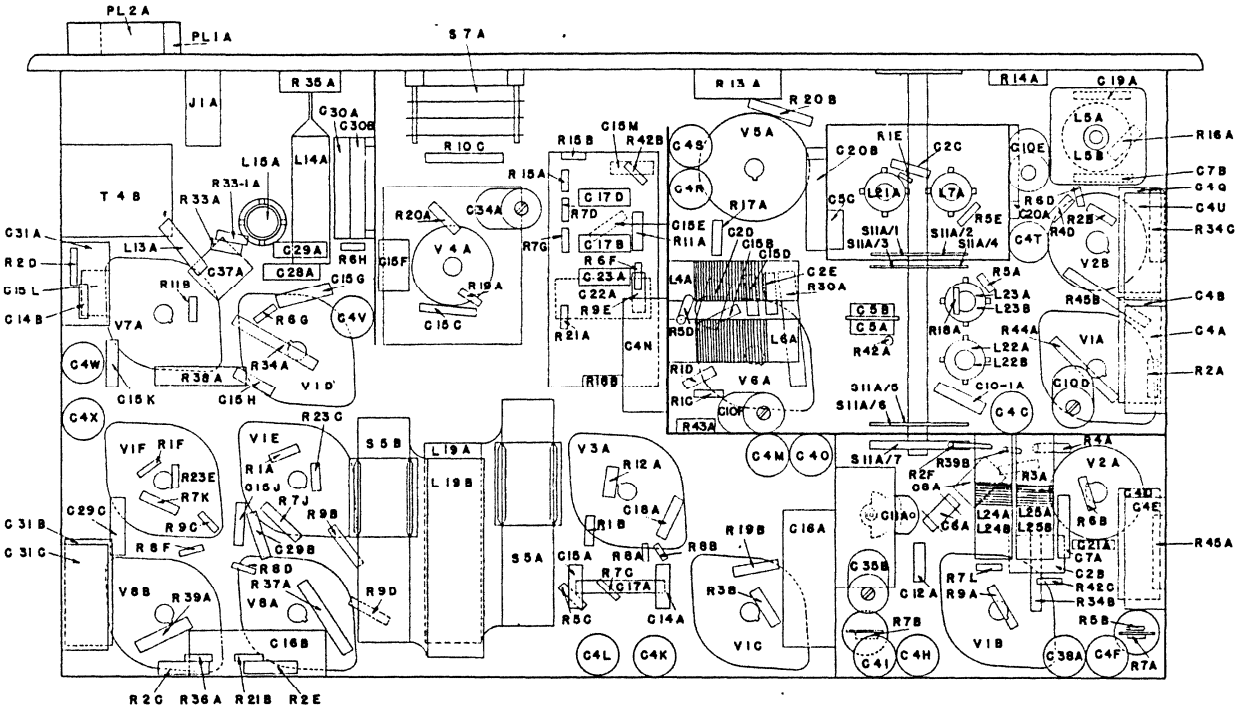
DURING THE PAUSE

16 TURN METER SWITCH TO AE AND PRESS PRESSEL-SWITCH
17 ADJUST VARIOMETER AND PA TUNING FOR MAXIMUM AE READING
18 LOCK FLICK MECHANISM

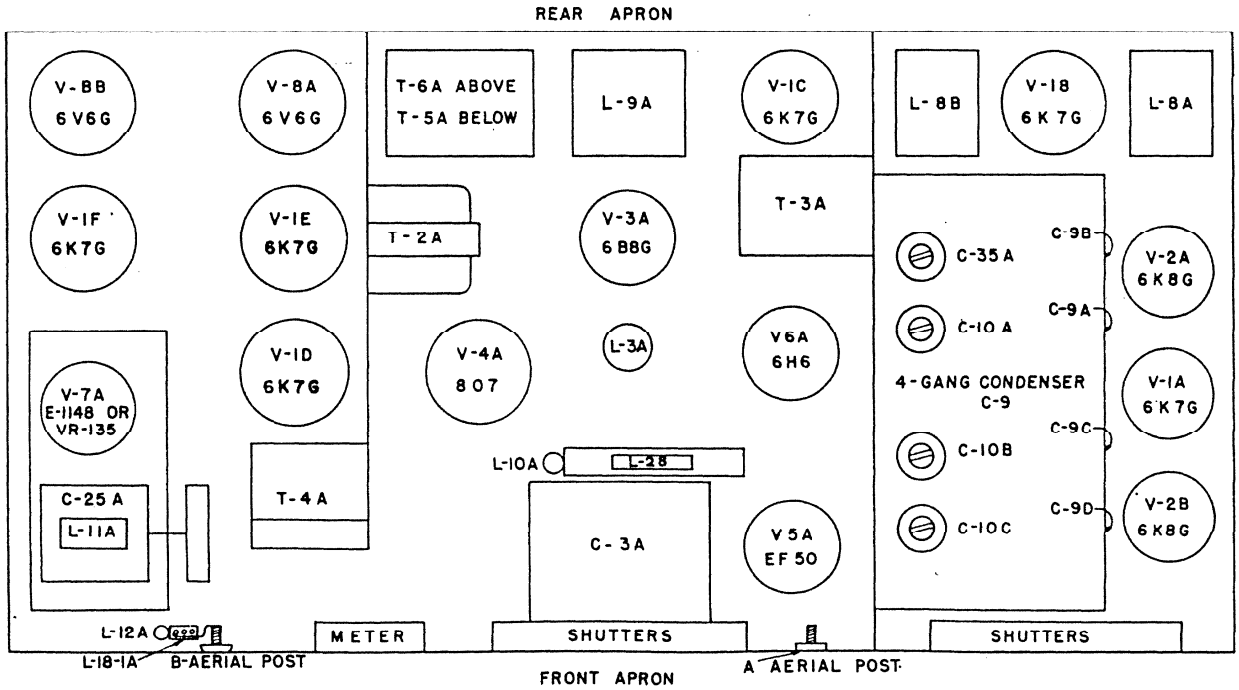
—NETTING DRILL FOR A-SET



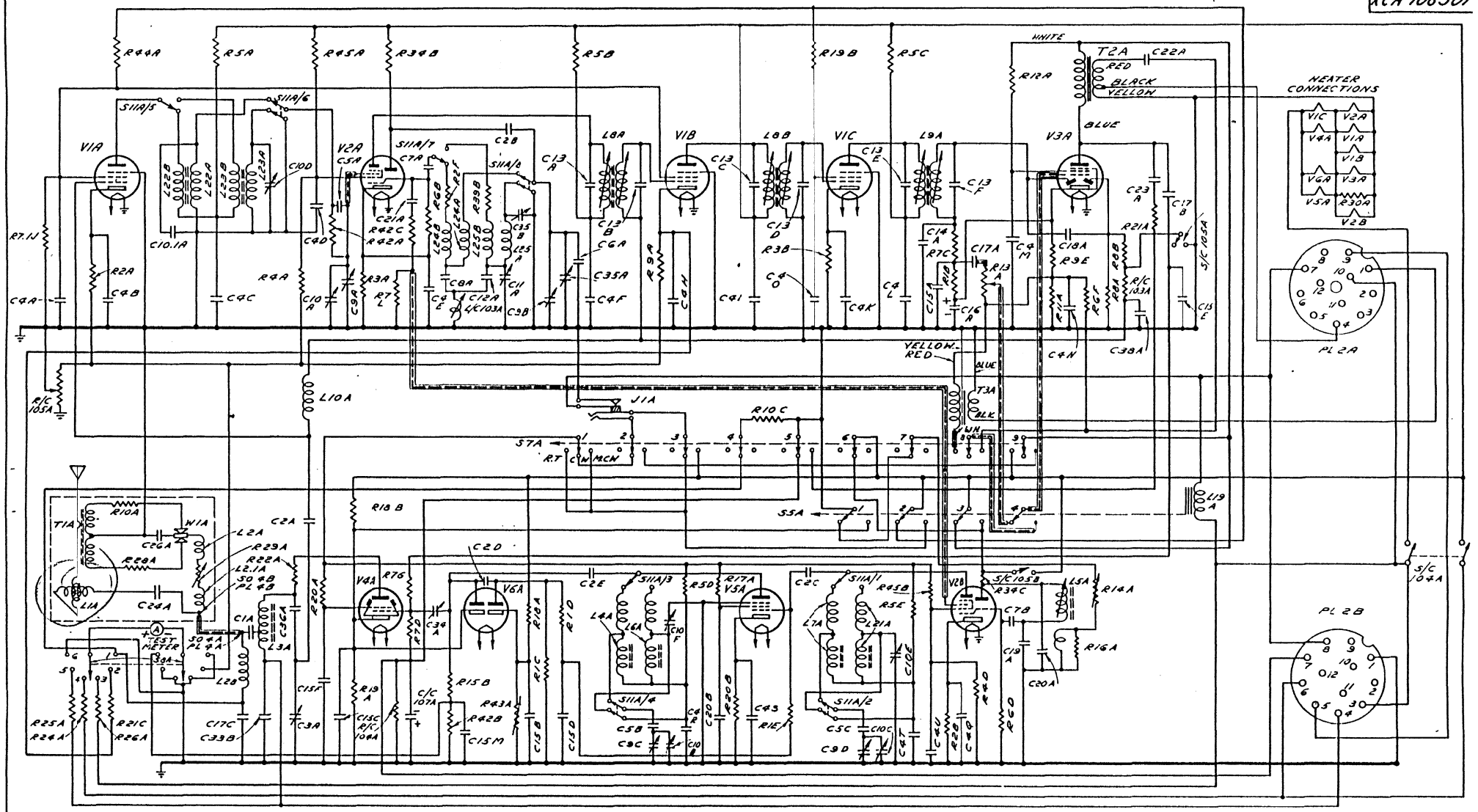
Schematic of Supply Unit



UNDERNEATH PLAN OF CHASSIS



TOP PLAN OF CHASSIS



PL 2A

1. "A" SET IN (MIC)	7	PRESS TO TALK "A" SET
2. "B" SET IN (MIC)	8	PRESS TO TALK "B" SET
3. I/C SET IN (MIC)	9	DRIVERS SIGNAL
4. "A" SET OUT (TEL)	10	"A" SET UNATTENDED
5. "B" SET OUT (TEL)	11	
6. I/C SET OUT (TEL)	12	

PL 2B

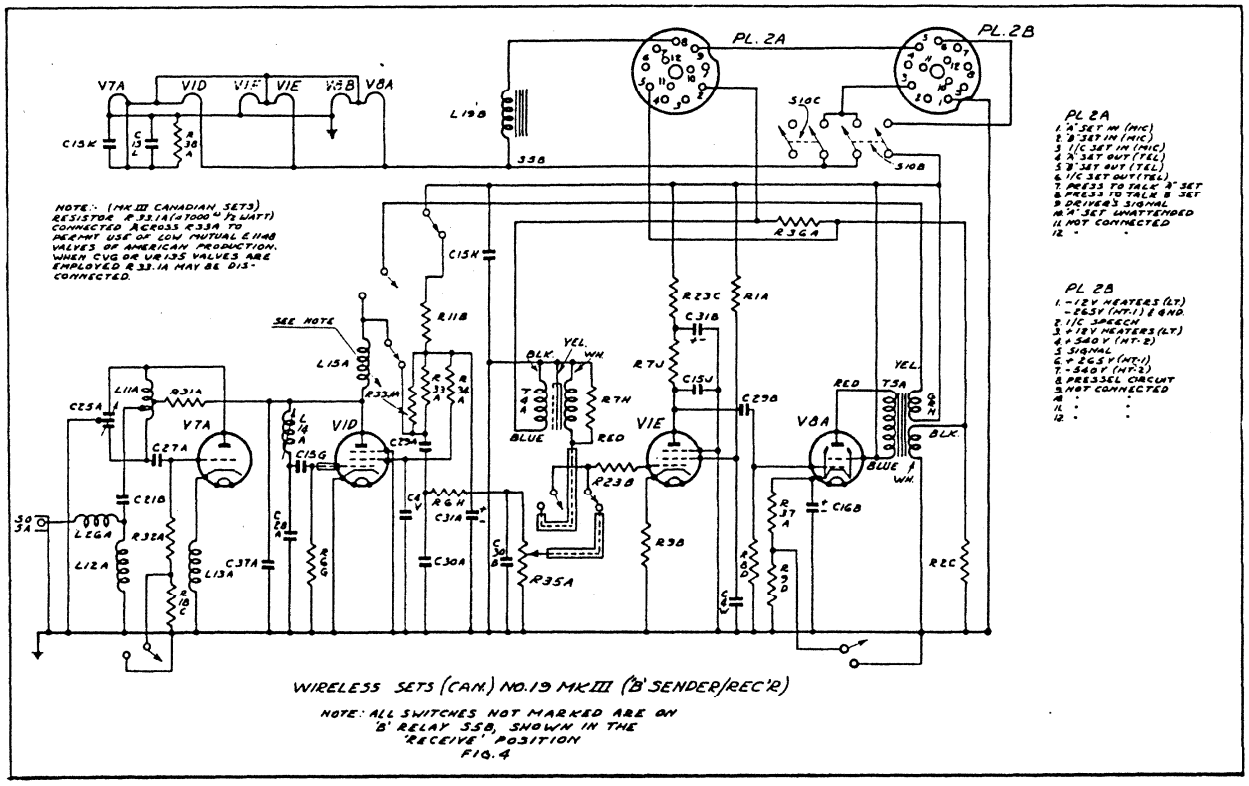
1. -12 V. HEAT (L.T.) - 26.5 V (NT.1) GND.	7	-540 V. (NT. 2)
2. - I/C SPEECH	8	PRESSEL CIRCUIT
3. + 12 V. HEAT. (L.T.)	9	NOT CONNECTED
4. + 540 V. (NT. 2)	10	" "
5. SIGNAL	11	" "
6. + 26.5 V. (NT. 1)	12	" "

S9A

1	A.E.
2	A.V.C.
3	L.T.
4	NT. 1
5	NT. 2
6	DRIVE

NOTES:
1. R.T./C.W./M.C.W. SWITCH (S7A) SHOWN IN C.W. POSITION. S/R. RELAY SHOWN IN RECEIVE POSITION.
2. BAND CHANGE SWITCH (S11A) SHOWN ON H.F. (4.1/2 - 8 MC/S) BAND.

-Schematic of A-Set

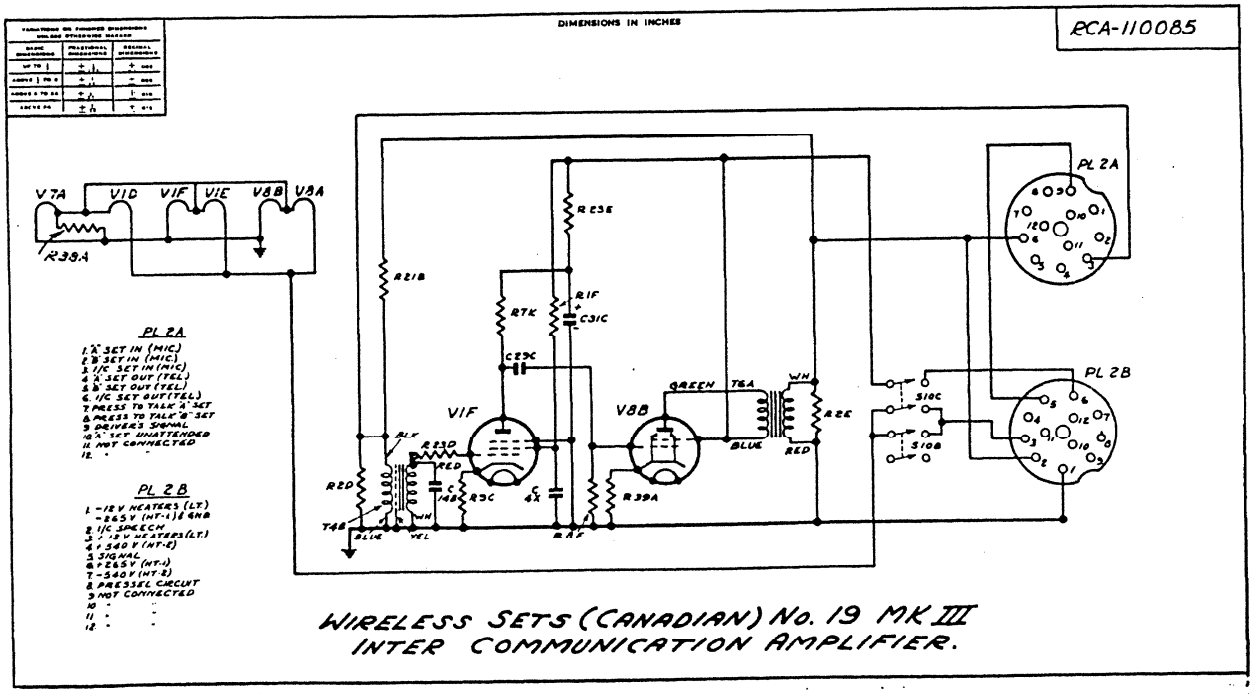


WIRELESS SETS (CAN.) NO. 19 MK III ('B' SENDER/REC'R)

NOTE: ALL SWITCHES NOT MARKED ARE ON 'B' RELAY 35B, SHOWN IN THE 'RECEIVE' POSITION

FIG. 4

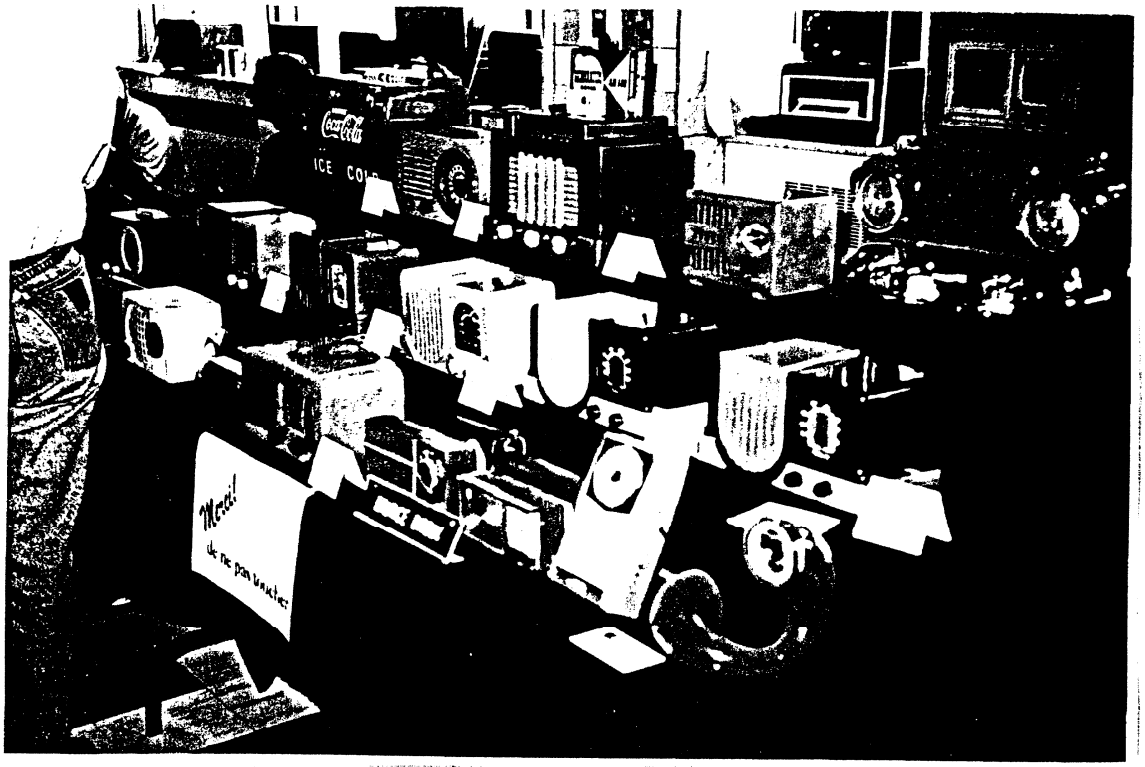
—Schematic of B-Set



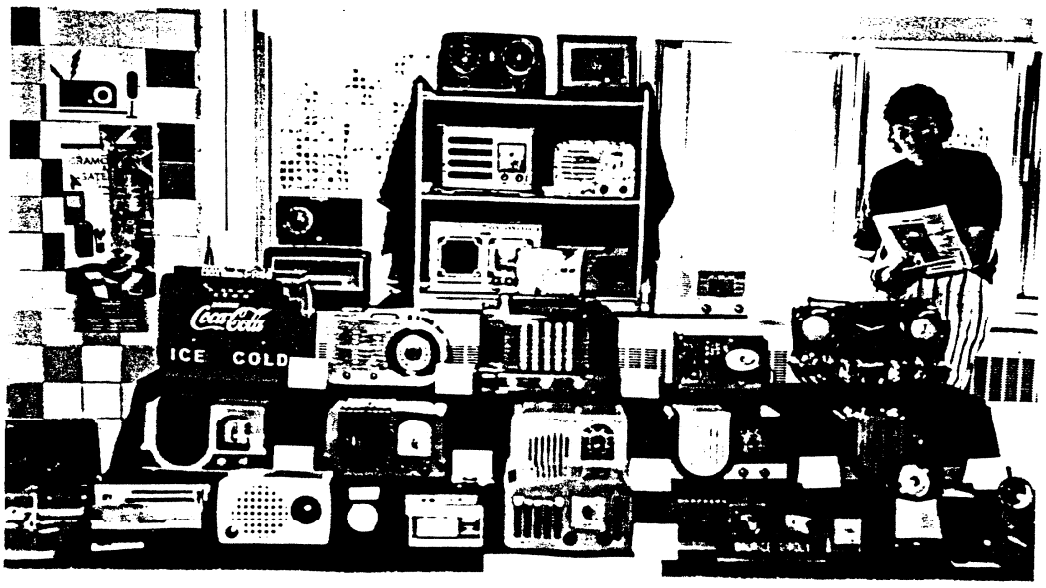
WIRELESS SETS (CANADIAN) No. 19 MK III
INTER COMMUNICATION AMPLIFIER.

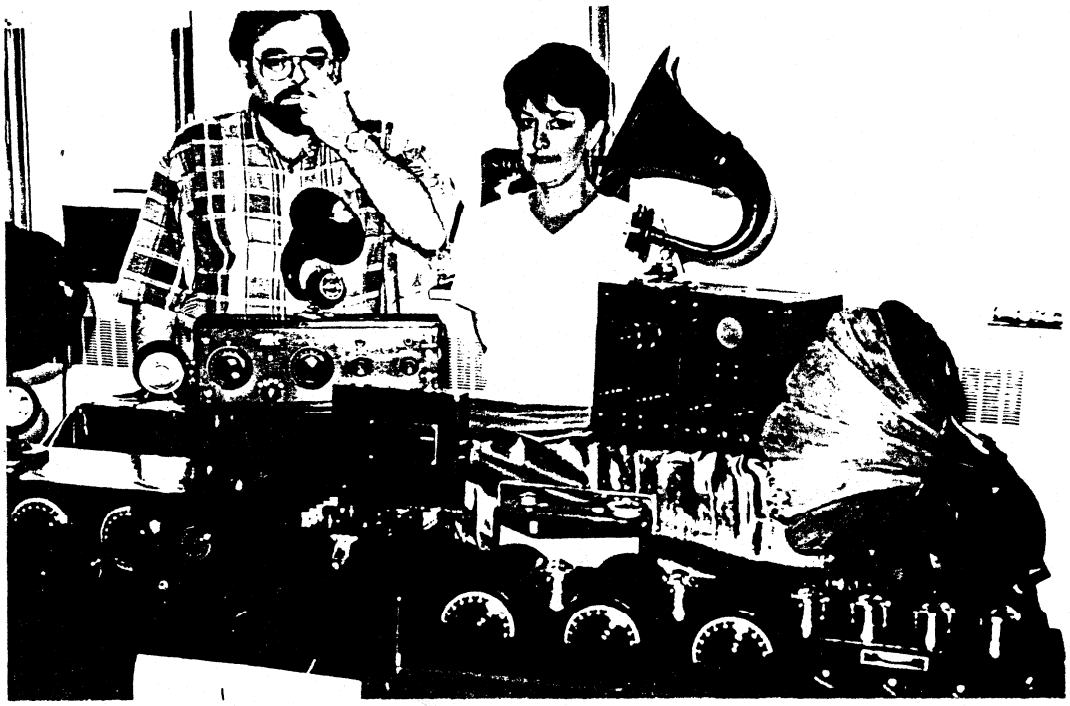
—Schematic of I-C Amplifier

Souvenir
7 Septembre 1996

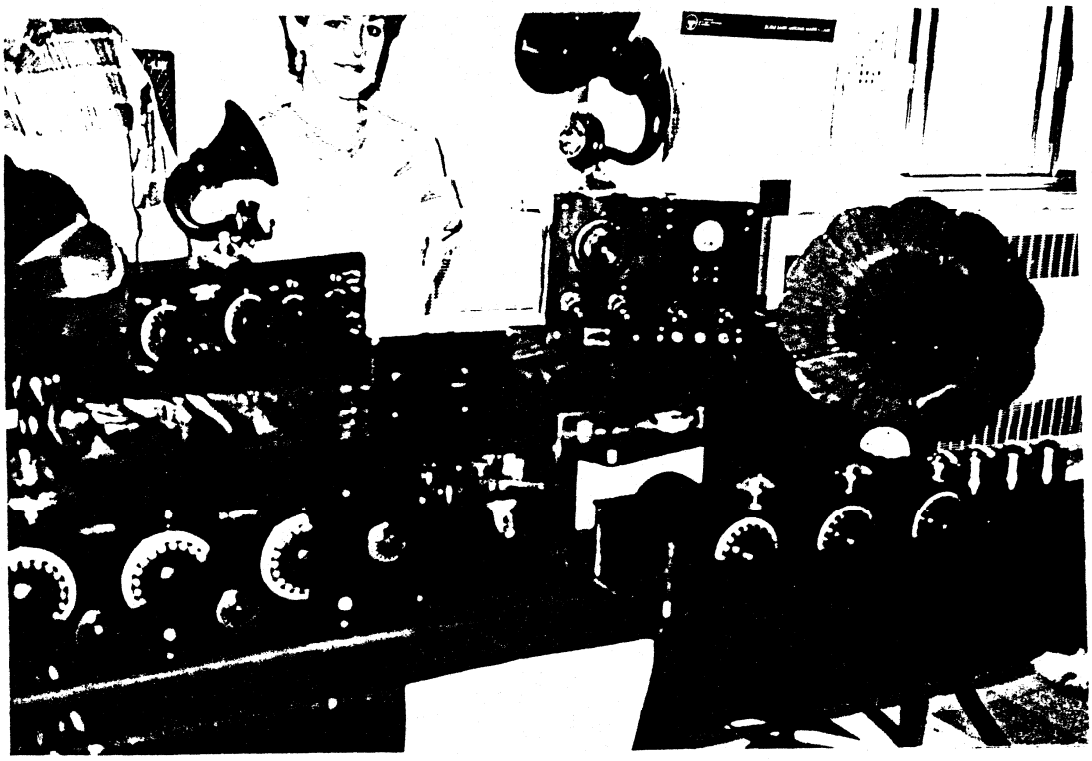


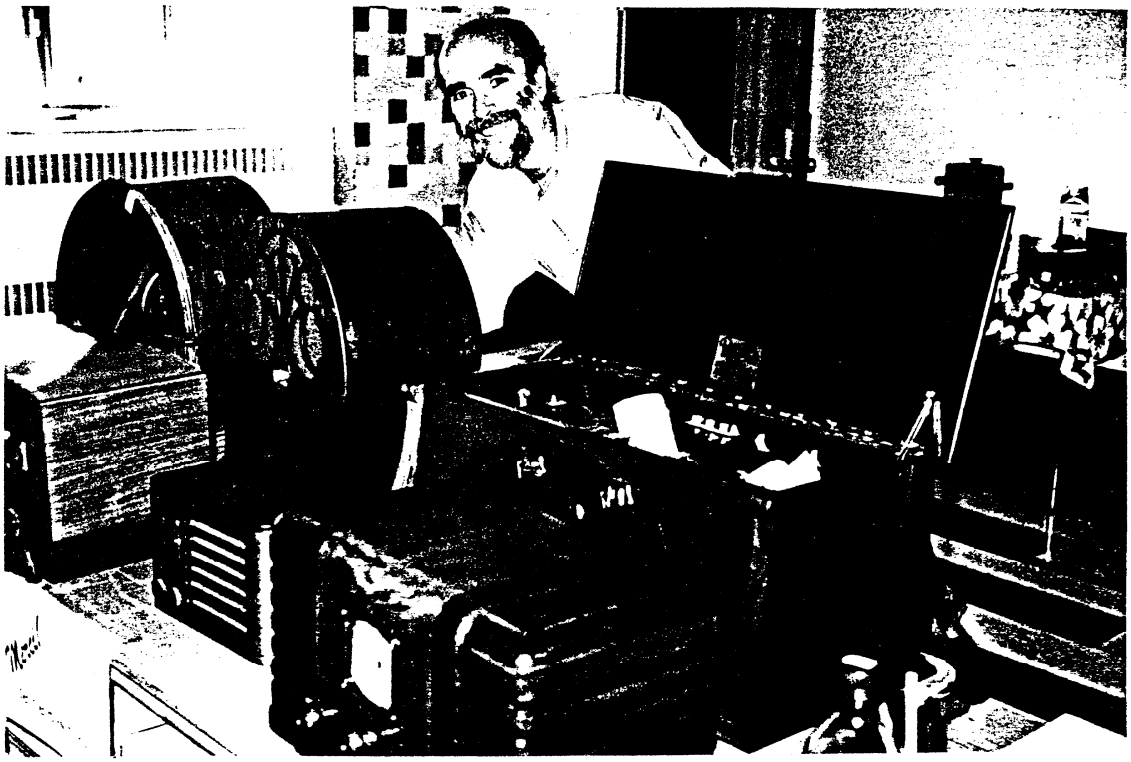
Ici nous visitons la table de notre ami Maurice Giroux de Laval, on ne pouvait pas se lasser de la regarder. Des catalins Addison et des radios incroyables....Bravo Maurice .tu ne passera jamais inaperçu et ne laissera jamais personne indifférent.



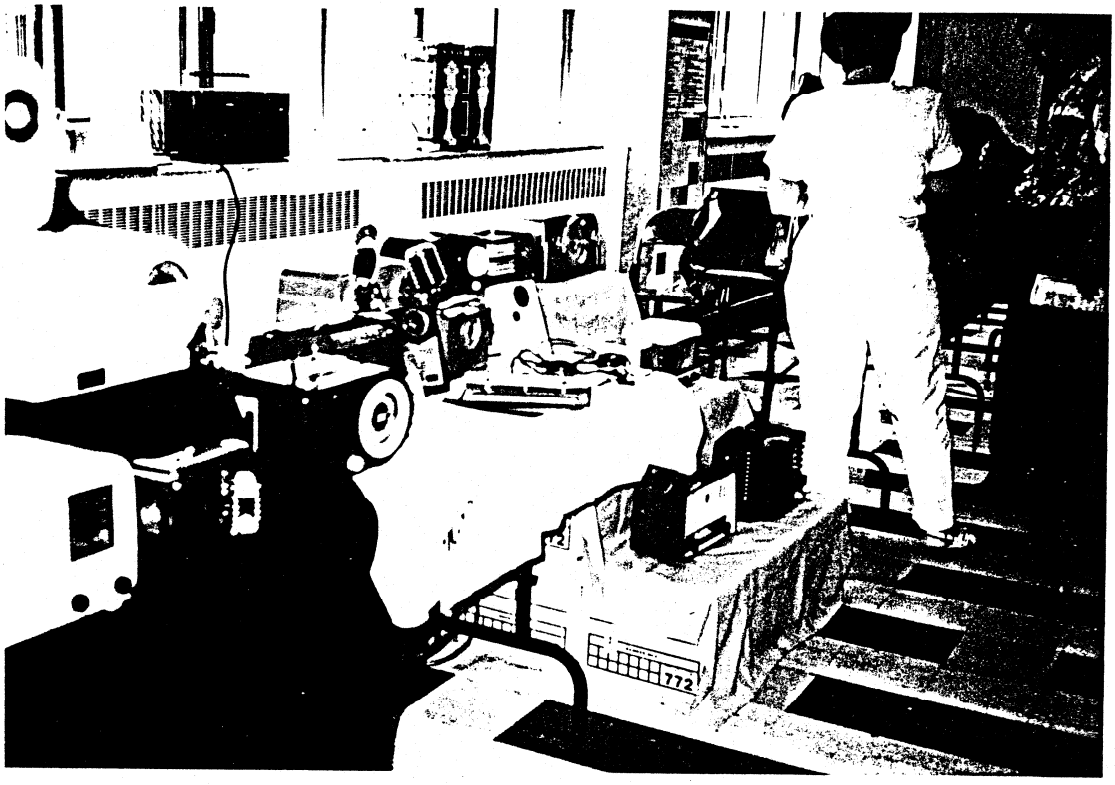


Ici nous visitons la table d'Eddy et Suzanne Clément de St-Léonard (MTL). Eddy replace ses lunettes mais le photographe est plus rapide ..La spécialité d'Eddy...bien voyons donc! Les années 20s....! Des TRF, des cornets Amplion et paradoxalement, des transistors des années '50-60. Suzanne aimerait bien fonder un club de conjointes des collectionneurs de radios. Et pourquoi pas !





Ci-haut, voici la table de notre confrère de Québec, Denis Tremblay. Denis est un vrai maniaque du détail et un collectionneur super cool ! Denis, tu as de quoi être fier....ta collection est admirable. En bas, notre ami Gilles Thibault de Montréal discute avec un visiteur. Gilles désire se spécialiser davantage dans les années '20s. Bonne chance !.....



On peut peut-être apercevoir notre confrère Jean-Guy gagné de Cap-de-la-Madeleine, en haut dans l'extrême droite. Dans la photo du bas, il y a Michel Arseneau de Boucherville, qui est occasionnellement pris d'un tic nerveux incroyable lorsqu'un appareil photo se pointe vers lui.....

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