THE General Radio EXPERIMENTER

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ELECTRICAL MEASUREMENTS AND THEIR INDUSTRIAL APPLICATIONS

STANDARDIZED TERMINALS AND CONNECTORS

PART II

● **IN PART I** of this article, the design and the features of the TYPE 938 series of binding posts were discussed. Another important type of terminal is the jack, designed to accept a banana plug, and typified by the TYPE 274-J Jack, which has been the industry standard for some 25 years. Not only are these jacks useful for making connections between various points with leads terminating in TYPE 274-DB Insulated Single Plugs and TYPE 274-MB Double Plugs, but they serve as excellent quick-connect-and-disconnect jacks for plug-in components. The length of the threaded portion will accommodate panel thicknesses up to ⅜".

The new TYPE 938-J Jack supplements the inexpensive general-purpose TYPE 274-J Jack and incorporates design features that tie it more closely to the TYPE 938 Binding Posts. In particular it has a long, unthreaded section that makes it suitable for mounting in TYPE 938-BB and TYPE 938-BR Insulators or TYPE 938-F Spacers; the hole into which the banana plug enters is chamfered to stabilize the plug by furnishing a seat for its shoulder; and it provides a soldering turret at the opposite end so that back-of-panel connections can be made by soldering directly to the body to avoid possible erratic contact in a soldering lug. The TYPE 938-X Jack Assembly, comprising a TYPE 938-J Jack and a pair of TYPE 938-BB Black Insulators, is listed as a complete assembly for convenience in ordering.

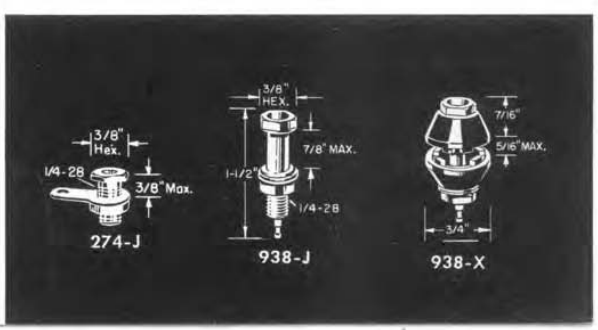


Figure 9. Dimensional sketches of the three standard General Radio jack terminals for banana plugs.

Type		See Figure§	Code Word	Unit Price† 10*–99	100–999
274-J	Jack	9	STANPARTOR	$.075	$.0495
938-J	Jack	9	STANPARACT	.175	.15
938-X	Jack Assembly	9	STANPARART	.30	.26

*Minimum quantity sold. †Net prices; no further quantity discounts.
‡For the convenience of the user, all jacks and jack assemblies are supplied unassembled.

CONNECTORS

For making connections to coaxial terminals, jacks, and binding posts, General Radio manufactures a line of connecting devices, whose basic elements are four types of connectors: The TYPE 874-C Coaxial Connector, the TYPE 274 (Banana) Plug, the TYPE 838-B Alligator Clip, and the standard telephone tip.

Coaxial Connectors

The TYPE 874-C,[1] TYPE 874-C8,[1] and TYPE 874-C58[2] Cable Connectors are intended for use whenever complete shielding, both electrostatic and electromagnetic, is necessary or when inductance of the ground connection is important. These connectors are, respectively, designed for use with General Radio TYPE 874-A2 Polyethylene Cable, Army-Navy Type RG-8/U Cable, and Army-Navy Type RG-58/U Cable. The TYPE 874-A2 Cable is a double-shielded flexible cable having a stranded inner conductor, polyethylene insulation, and a non-contaminating vinyl jacket. It differs from the Type RG-8/U Cable in having a nominal characteristic impedance of 50 ohms and somewhat better mechanical flexibility. For high-frequency applications, where excellent shielding is essential, TYPE 874-R20 Patch Cords, comprising a three-foot section of TYPE 874-A2 Cable terminated at each end in a Type 874-C connector, are offered as complete assemblies. For low-frequency applications, where good mechanical flexibility is more important than the utmost in shielding, TYPE 874-R21 Patch Cords, which are made up with single-shielded cable, are recommended. Both patch cords plug easily into all TYPE 874 Coaxial Elements.

Figure 10. View showing connections to the Type 1001-A Standard-Signal Generator and the Type 1023-A Amplitude Modulator using Type 874 Coaxial Connector. Cable connectors plug easily and quickly into panel connectors to give complete shielding and low VSWR.

Type§		Code Word	Price
874-R20	Patch Cord	COAXHATTER	$6.00
874-R21	Patch Cord	COAXHUNTER	5.50

§See Figure 11.

[1] W. R. Thurston, "Simple, Complete Coaxial Measuring Equipment for the U-H-F Range," *General Radio Experimenter*, XXIV, 8, January, 1950.
[2] "Coaxial Connectors for RG-58/U and Other Cables," *General Radio Experimenter*, XXVI, 11, April, 1952.

Figure 11. View of the Type 874-R20 Patch Cord (left) and the Type 874-R21 Patch Cord (right).

Banana-Plug Types

TYPE 274 Banana Plugs are offered in several forms. For use with plug-in components, they are available with threaded studs, tubular-rivet heads, and jack tops designed to accept other TYPE 274 Plugs. For use with connecting leads, they are available as TYPE 274-DB Insulated Single Plugs and as the well-known TYPE 274-MB Double Plug. The designs for these insulated plugs are completely new, and many important improvements over the older TYPE 274-D and TYPE 274-M have been incorporated.

All insulation is polystyrene to assure excellent electrical characteristics; red and black color coding is available for the single plugs; the insulating bodies are so shaped that, when the plugs are inserted into the jack tops of insulated-top TYPE 938 Binding Posts or other insulated TYPE 274 Plugs, all metal surfaces are covered except those immediately surrounding the cross holes into which the connecting wires are inserted. The setscrews are tapped into the cross holes coaxially with the banana plugs rather than at right angles and are located at the bottom of the jack-top holes. Set with a screwdriver inserted into the jack-top holes, they are not exposed when leads are connected. The metal parts at the entrances of the jack-top holes are recessed within the insulation to prevent a user's fingers from accidentally coming in contact with live metal when the plugs are being handled. Maximum insulation, consistent with a design in which leads are connected in a direction normal to the center line of the banana plugs, has therefore been achieved. In other respects the design features of the TYPE 938 Binding Posts have been reproduced.

The jack-top holes are so shaped that, when plugs are inserted, the junction is stabilized mechanically by a chamfer into which the plug shoulder enters; the cross holes will accept telephone tips and wires in sizes up to AWG No. 10 without shearing; connections can be easily made to the metal parts within the jack-top holes by TYPE 838-B Alligator Clips.

The TYPE 274-ND Shielded Double Plug supplements the TYPE 274-DB and TYPE 274-MB Insulated Plugs for applications where coaxial cables must be used to assure good electrostatic shielding but where there is no need for the excellent electromagnetic shielding and low ground-connection inductance of a complete coaxial system. This connector comprises a pair of TYPE 274-P plugs mounted on an insulating piece surrounded by an oval die-cast metal shell.

When the connector is plugged into a pair of TYPE 938 Binding Posts, the shell extends down over the binding posts and insulators to a level that just clears the metal panel, thereby providing almost complete electrostatic shielding. Previously this connector has been furnished with a hole through one end of the oval adjacent to one of the TYPE 274-P Plugs through which the cable passes. For use with unbalanced systems that follow the convention of having the lower of a pair of binding posts on a vertical panel at ground potential, the connector has been so connected that the cable is brought out at the bottom. Its design has now been modified so that the cable can be brought out at either top or bottom, the unused hole being covered with a snap button. At the same time a spring connection has been added to the internal assembly so that the new TYPE 274-NF Shielded Cable can be plugged in directly from the top.

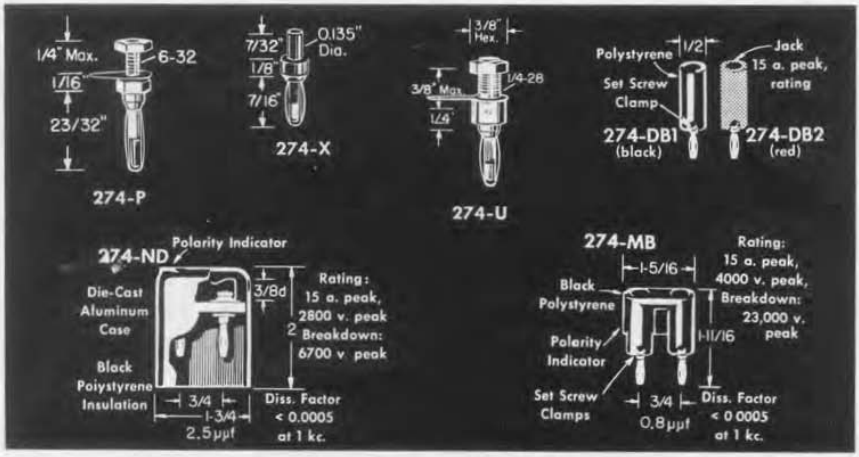


Figure 12. Dimensional sketches of General Radio banana-plug connectors.

Type§		Code Word	Unit Price† 10*–99	100–999
274-P	Plug	STANPARCAT	$0.125	$0.105
274-X	Plug	STANPARTIN	.085	.067
274-U	Plug	STANPARGOT	.15	.13

Type§		Code Word	Unit Price† 1*–9	10–99	100–199	200–999
274-MB	Double Plug	STANPARBUG	$0.65	$0.55	$0.52	$0.49
274-DB1	Insulated Single Plug (black)	STAPLUGANT	.50	.40	.38	.36
274-DB2	Insulated Single Plug (red)	STAPLUGARC	.50	.40	.38	.36

*Minimum quantity sold. †Net prices; no further quantity discounts.

274-ND	Shielded Double Plug	STAPLUGDOG	$1.50 each

§See Figure 12. For the convenience of the user, TYPES 274-P and 274-U are shipped unassembled.

Patch Cords

This new TYPE 274-NF Cable has been introduced to make it possible to assemble, quickly and easily, a coaxial cable terminating in any of the TYPE 274, 874, or 838 Connectors. It consists of a three-foot length of flexible, 50-ohm cable terminated at each end in a standard telephone tip and slotted sleeve combination that resembles the so-called phonograph connector. This coaxial fitting plugs directly into the TYPE 274-ND Shielded Double Plug for connection to TYPE 938 Binding Posts or into a TYPE 874-Q6 Adaptor for connection to a TYPE 874 Coaxial Connector. A 3" pigtail terminated in a standard telephone tip and connected to the outer conductor is also provided at each end for attaching the non-coaxial TYPE 274 and TYPE 838 Connectors. A truly universal set of coaxial cables can there-

Figure 13. Dimensional sketches, with specifications, of the Type 274-NF Shielded Lead Assembly.

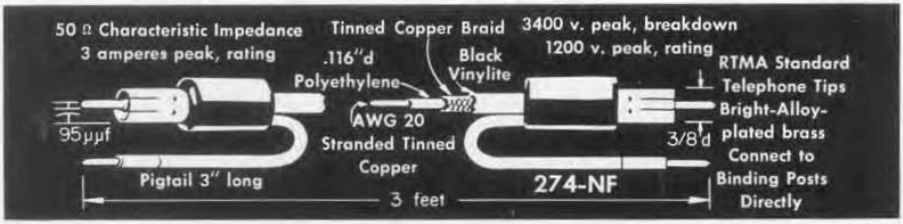


Figure 14. Two patch cords using the Type 274-NF Shielded Lead Assembly: (left) the Type 874-R31 Patch Cord, pin-and-sleeve to 50-ohm coaxial, and (right) the Type 874-R32 Patch Cord, shielded double banana plug to 50-ohm coaxial. Coaxial connector is Type 874-Q6 Adaptor.

fore be easily obtained. Complete assemblies listed are the TYPE 274-NC Patch Cord, which now consists of a TYPE 274-NF Shielded Cable and two TYPE 274-MB Double Plugs (see Figure 16); the TYPE 274-NE Patch Cord, which now consists of a TYPE 274-NF Shielded Cable and two TYPE 274-ND Shielded Double Plugs (see Figure 16); the old TYPE 874-R31 Patch Cord, which now consists of a TYPE 274-NF Shielded Cable and one TYPE 874-Q6 Adaptor; the TYPE 874-R32 Patch Cord, which now consists of a TYPE 274-NF Shielded Cable, one TYPE 274-ND Shielded Double Plug, and one TYPE 874-Q6 Adaptor; and a new TYPE 274-NH Patch Cord consisting of a TYPE 274-NF Shielded Cable, a TYPE 274-ND Shielded Double Plug, and two TYPE 838-B Alligator Clips. In addition to these combinations, any other desired combination can be secured by individual purchases of the basic TYPE 274-NF Shielded Cable and the appropriate terminating connectors. The pigtail connection, which is not needed for the coaxial connection to the TYPE 274-ND Shielded Double Plug proper, serves a useful function as an auxiliary ground connection for an output system that may be operated balanced or unbalanced. A frequently used binding-post arrangement consists of three binding posts in a vertical row, the two top binding posts providing a connection to the balanced output and the bottom binding post a convenient ground point to which the middle binding post can be connected by a TYPE 938-L Shorting Link when unbalanced operation is desired. Connection to this binding-post arrangement cannot be used with a TYPE 274-ND Shielded Double Plug when the middle and bottom binding posts are connected with the TYPE 938-L Shorting Link because of interference between the connector shell and the link. When the TYPE 274-NF Shielded Cable is used, however, the TYPE 938-L Shorting Link can be dispensed with, the TYPE 274-ND Shielded Double Connection to the bottom binding post made with the cable pigtail.

Figure 15. Views illustrating the various methods of connection possible with the Type 274-NF Shielded Lead Assembly and the Type 274-ND Shielded Double Plug. Left to right:
(1) The Shielded Double Plug terminating a shielded cable and plugged into a pair of Type 938 Binding Posts.
(2) The Type 274-NE Patch Cord plugged into a pair of Type 938 Binding Posts with the telephone-tip pigtail connected to a grounded post.
(3) The Type 274-NE Patch Cord plugged into a pair of binding posts, with the unused telephone-tip pigtail tucked into the cable sheath.
(4) The Type 274-NF Patch Cord with its pin terminals connected directly to a pair of binding posts and with a Shorting Link (Type 938-L) connecting to a grounded post.

COMPLETE LEAD ASSEMBLIES

Type		*See Figure*	*Code Word*	*Price*
274-NC	Shielded Lead Assembly with Unshielded Terminals	16	STANPARZOO	$3.80
274-NE	Shielded Lead Assembly with Shielded Terminals	16	STAPLUGEYE	5.50
274-NH	Shielded Lead and Plug Assembly with Alligator Clips	16	STANPARMAP	4.25
274-NF	Basic Shielded Lead Assembly	13	STANPARGAG	2.50
874-R31	Pin and Sleeve to 50-ohm Coaxial	14	COAXFLEXOR	4.50
874-R32	Shielded Banana Plug to 50-ohm Coaxial	14	COAXFITTER	5.75
874-Q6	Pin Jack to Coaxial Adaptor	14	COAXCLOSER	2.00

For use where mechanical clearances are too small for the new models, we can still supply the permanently assembled older types, now designated as TYPE 274-NCO and TYPE 274-NEO. They are priced the same as the new models.

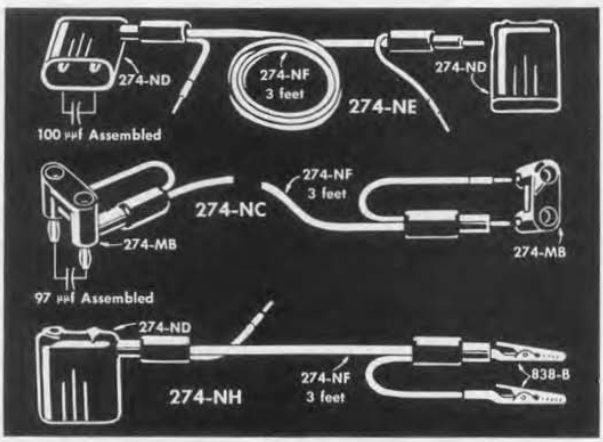


Figure 16. View of three patch cords made up from the basic Type 274-NF Shielded Lead Assembly.

TEST LEADS

The new TYPE 838 Parts provide a system of test leads and connectors comparable in versatility to the patch cords made up with the TYPE 274-NF Shielded Cable. Comprising test leads, test prods, and alligator clips, they differ from the hardware items usually found in the laboratory in the quality of the materials used and in their adaptability to different applications and connection configurations. The common element is the RTMA standard telephone tip, in which each end of the test leads is terminated. Connections can be made with this tip to every one of the terminating connectors described in this article except the TYPE 274-ND Shielded Double Plug and the TYPE 874-Q6 Adaptor. The TYPE 838-AR and TYPE 838-AB Test Leads, made of AWG No. 18 flexible wire, have high-grade rubber insulation

Figure 17. View of the Type 838 Test Leads, Prods, and Clips.

color-coded red or black, and are furnished in lengths of 6″, 12″, and 30″. The TYPE 838-C and TYPE 838-D Test Prods have bright-alloy-plated phosphor-bronze telephone tips, pointed for piercing insulation, and phenolic insulation at the top accepts any standard telephone tip. Not only can test leads be plugged into this socket, but any number of test prods can be stacked up to produce a test prod of extra length for making connections to points that are difficult of access. When multiple test prods of this type are assembled, no gaps in insulation occur, so that there is no exposed metal with which the hands of a user can come in contact. The TYPE 838-B Alligator Clips, made of nickel-plated brass, have ferrules shaped to act as a socket for standard telephone tips or TYPE 274 Banana Plugs. They can therefore be used as a clip extension for any connector described in this article except the TYPE 874-Q6 Adaptor.

Type§		Code Word	Unit Price† 5*–9	10–19	20–99	100 up
838-AB6	6″ Black Test Lead	STANPARLAP	$0.40	$0.38	$0.36	$0.34
838-AB12	12″ Black Test Lead	STANPARLEG	.40	.38	.36	.34
838-AB30	30″ Black Test Lead	STANPARLID	.45	.43	.41	.38
838-AR6	6″ Red Test Lead	STANPARLOG	.40	.38	.36	.34
838-AR12	12″ Red Test Lead	STANPARLOT	.40	.43	.36	.34
838-AR30	30″ Red Test Lead	STANPARLUG	.45	.43	.41	.38

Type§		Code Word	Unit Price† 1–9	10–99	100–199	200–999	1000 up
838-C	Red Test Prod	STANPARPIN	$1.00	$0.95	$0.90	—	—
838-D	Black Test Prod	STANPARPEG	1.00	.95	.90	—	—
838-B	Alligator Clip	STANPARNIP	—	.20*	.19	$0.18	$0.17

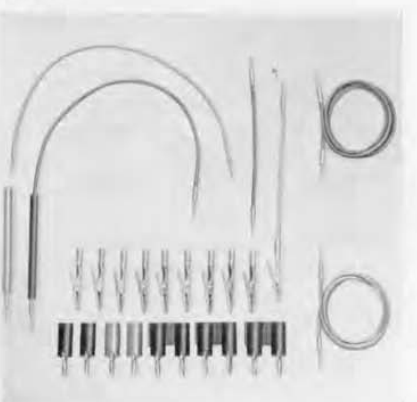
*Minimum quantity sold. †Net; no further quantity discounts. §See Figure 17.

TEST LEAD KIT

A handy kit of test leads and connectors is now available at a considerable saving over the price of the parts purchased separately. This kit consists of:

1 TYPE 838-C Red Test Prod
1 TYPE 838-D Black Test Prod
1 each TYPE 838-AR Red Test Leads, 6″, 12″, and 30″
1 each TYPE 838-AB Black Test Leads, 6″, 12″, and 30″
10 TYPE 838-B Alligator Clips, of phosphor bronze
3 TYPE 274-MB Double Plugs
4 TYPE 274-DB Insulated Single Plugs

Type		Code Word	Price
838-K	Test Lead Kit	KIOSK	$7.75



This completely integrated line of terminals, connectors, and leads has met the diversified requirements of General Radio instruments in a most satisfactory manner. Old instruments have been changed to utilize the new parts and new instruments incorporate them as standard. Your laboratory or manufacturing problems should be similar to ours. Why not try them?

— H. C. LITTLEJOHN

MISCELLANY

SPEAKERS: DONALD B. SINCLAIR, General Radio Chief Engineer and President of the Institute of Radio Engineers, spoke at the Spring Technical Conference on Television at Cincinnati, April 19, and at the Airborne Electronics Conference in Dayton, May 13. He was the keynote speaker at the Southwestern IRE Conference in Houston, May 16, and gave the luncheon address at the Conference on Electronics and Machines, sponsored by the Chicago Professional Group on Industrial Electronics, where his subject was "What's Happened to Measurements?" He also spoke at the New England Radio Engineering Meeting and at local section meetings in Evansville, Indiana; Cedar Rapids, Iowa; Kansas City, Missouri, and New York.

In late April, Dr. Sinclair attended the Institution of Electrical Engineers, Radio Section, Convention on "British Contributions to Television" held in London. At the dinner held in conjunction with this Convention, he responded to the toast to overseas delegates.

— ARTHUR E. THIESSEN, Vice-President for Sales, spoke at the Convention of the Scientific Apparatus Makers of America in Chicago, May 9, on "Doing Business with the Government."

— WILLIAM R. SAYLOR, Engineer, delivered a paper on "Stroboscopic Measurements in Textiles" at the Northern Textile Conference of the American Institute of Electrical Engineers at Philadelphia, April 24.

Summer Closing

VACATION—During the weeks starting July 28 and August 4, most of our employees will be vacationing. Manufacturing departments will be closed and other departments will be manned by a skeleton staff. Every effort will be made to take care of urgent business, but repairs cannot be made, except in hardship cases. Our Service Department requests that shipments of material to be repaired be either scheduled to reach us well before this vacation period or delayed until afterward.

Western Electronic Show and Convention

The Western Convention, Institute of Radio Engineers, and the Western Electronic Show will be held at the Municipal Auditorium, Long Beach, California, August 27-29, 1952. *Experimenter* readers attending the show are cordially invited to visit the General Radio booth and to look over the display of equipment for measuring impedance, voltage, power, and frequency at ultra-high frequencies. The new Sound-Level Meter and Sound-Survey Meter recently described in the *Experimenter* will also be displayed.

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