

APPLICATION NOTES

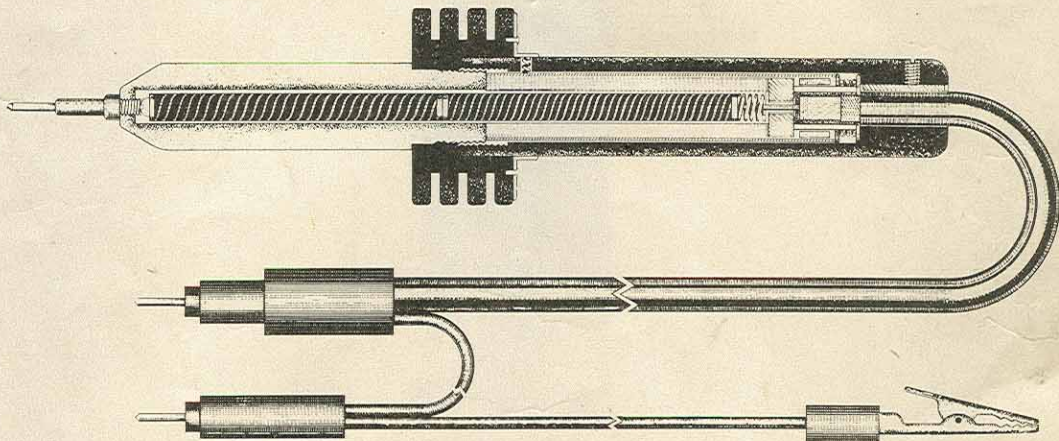
FOR

PRECISION

HIGH VOLTAGE MULTIPLIER PROBE

SERIES TV

MODELS TV-1 AND TV-2



DANGER!!

WARNING! - Do NOT ATTEMPT TO USE YOUR TV PROBE UNTIL THESE NOTES HAVE BEEN FULLY READ.

THE HIGH VOLTAGES which require the use of this probe could result in serious and fatal accidents UNLESS the probe is utilized in accordance with this application guide!

PRECISION APPARATUS COMPANY, INC.

92-27 HORACE HARDING BLVD.

• ELMHURST, NEW YORK

Prior to the advent of modern High Voltage Television power supplies, the usual maximum voltage requirements of radio receiver circuit testing did not exceed approximately 1000 volts D.C.

However, modern large screen television has extended the high voltage operating range upwards to approximately 30,000 volts D.C.

To meet this rapidly growing need for high voltage test facilities, Precision has engineered and produced the versatile High Voltage Multiplier Probe (Series TV) which combines utmost flexibility of multiplier facilities with most extensive safety and protective features, absolutely essential when dealing with such high potentials.

A. SUMMARY OF FEATURES

1. Molded, high polished, Polystyrene Probe Head. Approximately 25,000 volts per millimeter dielectric strength. Unusually long leakage path between high voltage test point and channelled Barrier-Guard.
2. Molded, High Polished Bakelite Barrier-Guard. Extended leakage path provided thru incorporation of four radial fins on an exceptionally large diameter barrier form.
3. Corona-resistant rounded-edge probe tip.
4. Helical-film, non-hygroscopic, steatite rod type, multiplier resistance Cartridge. This spring-mounted tubular cartridge requires and employs no soldered connections. It is quickly and conveniently removed for replacement and/or substitution.
5. Grounded Safety Leakage Guard. This dual purpose identification plate and Safety Guard-ring, (grounded by means of a concealed contact spring), serves as a final and positive ground return for any unusual leakage potentials which might develop along the Head and Barrier due to operational negligence or excessive moisture. (See pg.2). Such voltages are thereby returned to ground BEFORE reaching the operator's hand.
6. Polystyrene Resistor Sleeve. The multiplier resistor cartridge is electrically isolated by a high dielectric, machined polystyrene tube.
7. Internal Brass Grounding Shield. Possibility of arc-over from multiplier resistor cartridge to operator's hand is eliminated by this concentric grounding tube providing maximum operator voltage-isolation.
8. Concentric Compression Contact Assembly. This interacting assembly permits automatic and positive contact to Resistor cartridge, internal shield and guard ring. The polystyrene disk and tubes provide additional high dielectric protection at the 6000 volt end of the probe handle.
9. Setscrew-Locked, Keyway-Block Cable Fastener - insures fool-proof and permanent connecting cable anchorage.
10. High Voltage Concentric Cable. Specially designed super-flexible test cable with full ground shield and overall jacket.
11. Universal Instrument Step-Jack. Allows insertion into small, large and recessed type .080" tip jacks.
12. Standard negative-ground tip jack.
13. Alligator type safety ground clip.

B. DESCRIPTION OF APPLICATION

Modern television high voltage supplies are predominantly High voltage-low current type units. High impedance voltage measuring instruments are therefore required in order that minimum load be placed upon the power supply.

The Series TV Probe has therefore been designed for use only with 20,000 ohms per volt instruments (such as Precision series 856, 858, 85, 954, 10-54, and 654), and DC vacuum tube voltmeters (typified by Precision Series EV-10). The resistance value of the multiplier cartridge is such as to extend the 6000 volt DC ranges of the above noted instruments to 30,000 volts DC,

reading on the related 3, 30 or 300 meter scale multiplied by a simple factor (adding zeros).

IMPORTANT!: A. If the Probe is to be used with "Precision" 20,000 ohms per volt instruments to extend the 6000 volts (high sensitivity) DC range to 30,000 volts DC, the Multiplier resistor marked "TV-2" must be used in the Probe. Cartridge TV-2 has total resistance value of 480 Megohms.

B. If the Probe is to be used with Series EV-10 V.T.V.M., to extend its 6000 volts DC VTVM range to 30,000 volts DC, the Multiplier Resistor marked "TV-1" must be used in the Probe. Cartridge TV-1 has a total resistance value of 533.33 Megohms.

* * * * *

If the Probe is to be used with any high impedance D.C. voltmeter or D.C. VTVM other than the Precision Models previously listed, Cartridges TV-1 and TV-2 cannot be used unless such other instruments have the identical sensitivity AND top range of 6000 volts as the Precision units.

If the characteristics of the voltage measuring instrument to be used differ from the above, consult your distributor regarding the availability of Multiplier cartridges to suit your application. He will require the following information concerning the instrument to be used in order to serve you.

1. Make and Model number of your test set.
2. Sensitivity in OHMS PER VOLT and the highest built-in DC voltage range (If non-electronic). The use of a television test probe is NOT recommended for sensitivities less than 20,000 ohms per volt.
3. Total DC input resistance, in megohms, at the Highest DC voltage range jack. (If Electronic or VTVM.)

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The "Precision" warranty applies ONLY when the TV Probe (with suitable cartridge) is employed in conjunction with the proper "Precision" test set. We cannot be responsible for results in other applications.

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C. OPERATING INSTRUCTIONS

IMPORTANT WARNING!!!

The High Potentials produced by the power supplies of modern T.V. receivers, while of low current capacity, can nevertheless be dangerous if sufficient care is not exercised. The following precautions should therefore be rigidly observed:

1. Hands, shoes, bench and floor must be DRY.
2. Always keep the Polystyrene Head and grooved Barrier free of all accumulated dirt and/or moisture.
3. Fingers must NOT extend over or beyond the multi-grooved Barrier of the TV Probe.
4. Alligator Grounding Clip MUST be properly clipped to negative side of the high voltage power supply (usually chassis) BEFORE voltage measurements are attempted.
5. Become fully acquainted with the location of all high potential points within the device under test!
6. When testing, extreme care must be observed in order to prevent accidental contact of the hand with exposed high potential points on the chassis of the TV receiver.
7. READ AND ADHERE TO THE PUBLISHED ALIGNMENT AND TEST PROCEDURES FOR THE PARTICULAR RECEIVER TO BE REPAIRED OR TESTED.
8. Occasionally check continuity of grounding connections within the probe by use of an ohmmeter. (Apply test prods of ohmmeter to the alligator Ground clip (item 16) and the outer edge of the Guard shield-nameplate). (item 5).

SEE PAGE (5) for identification of TV Probe components referenced in these instructions by item numbers.

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EXAMPLE OF OPERATION

1. Examine the identification markings of the Multiplier cartridge (visible thru the transparent polystyrene Probe Head): - - -

TV-2 cartridge is to be used only for 20,000 ohms per volt Precision instruments or equal; TV-1 cartridge is to be used only for Precision VTVM Series EV-10 or equal.
2. Observe all previously noted Safety Precautions!
3. Insert the small black test tip (item 15) into the negative jack of the test instrument.
4. Insert the large black stepped-plug tip (item 14) into the 6000 volts DC (high sensitivity) jack of the test instrument.
5. Set the selectors of the test instrument as for reading the 6000 volts D.C. high sensitivity range.
6. From published alignment and test literature for the particular T.V. set or device under consideration, locate the positive and negative polarity high voltage points.
7. Clip the black alligator-type negative test lead to the negative point of the receiver high voltage supply (usually chassis).
8. Make contact to the positive point of the High voltage supply with the TV Probe tip (item 1).
9. The meter of the indicating instrument will be read on the basis of 30,000 volts full scale or as a 30,000 volts range.

For example should the Probe be used with Precision Series 85 multi range test set, the Probe will utilize cartridge TV-2. Voltage indications will be read on the 0-300 scale, multiplying each reading by a factor of 100. The 0-300 scale thus becomes a 0-30,000 scale.

D. REPLACEMENT OR REMOVAL OF MULTIPLIER CARTRIDGES.

1. With one hand, firmly grasp BOTH the probe handle (item 13) and the probe Barrier (item 2). Unscrew the polystyrene head (item 1) with the other hand. (If possible, do not separate the barrier from the handle: - if such happens, the small Guard spring (item 6) under the flange of the Guard-nameplate may pop out.) Insert the required multiplier cartridge, spring-end (item 4) first. Replace the polystyrene head tightly enough so that the Barrier does not rotate.



E. MAINTENANCE

IMPORTANT! In all cases of suspected malfunctioning, always check the operation of the instrument or test set FIRST!

Should the source of difficulty appear to locate in the TV Probe, the following checks may be performed in the order listed:-

1. If high range ohmmeter facilities (1000 megohms or higher, as incorporated in Precision Series EV-10 V.T.V.M.) are available, check for series continuity between the Probe tip (item 3) and the step jack tip (item 11). If the probe is functioning properly, the approximate value of resistance marked on the multiplier cartridge should be obtained on the High range ohmmeter

2. Should a high range ohmmeter be unavailable, the continuity of the multiplier cartridge and the contact connections may be checked as follows:

- A. Remove the multiplier cartridge from the probe using the procedure detailed in section D. of these instructions.

- B. Short-circuit the cartridge by connecting a length of fine wire (approximately No. 32 B&S Gauge) between the screws at either end of the cartridge. Re-insert the cartridge into the Probe, and replace the polystyrene Head.
- C. Check the Probe for continuity as outlined in Step 1 above, using a low range ohmmeter. If short circuit or zero ohms reading is obtained (and the Probe does not yield proper indications with normal usage), then the cartridge is probably open-circuited and requires replacement. If no short circuit is obtained (using the short-circuited cartridge, then an open circuit in the cabling connections probably exists.

In any case of, apparently defective operation of the probe, do not attempt any check or repairs other than detailed above. -- Neglect in insuring continuity of all grounded connections can nullify the effect of the carefully designed safety provisions provided in your Series TV Probe

SPECIAL NOTE RE REPAIR SERVICE

When returning any Precision instrument for service, ALWAYS pack carefully in a strong, over-sized corrugated shipping container, using a generous supply of padding such as excelsior, shredded paper, or crumpled newspaper. The original container and its pads (if available) is ideal for this purpose. Ship via Railway Express PREPAID and mark for:

PRECISION APPARATUS COMPANY, INC.
92-27 Horace Harding Blvd.
Elmhurst, L.I., N.Y.

ATT: Service Division

Fragile label should appear on at least four sides of the carton.

NEVER return an instrument unless it is accompanied by full explanation of difficulties encountered. The more explicit the details, the more rapidly your instrument can be handled and processed.

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U.S.A.

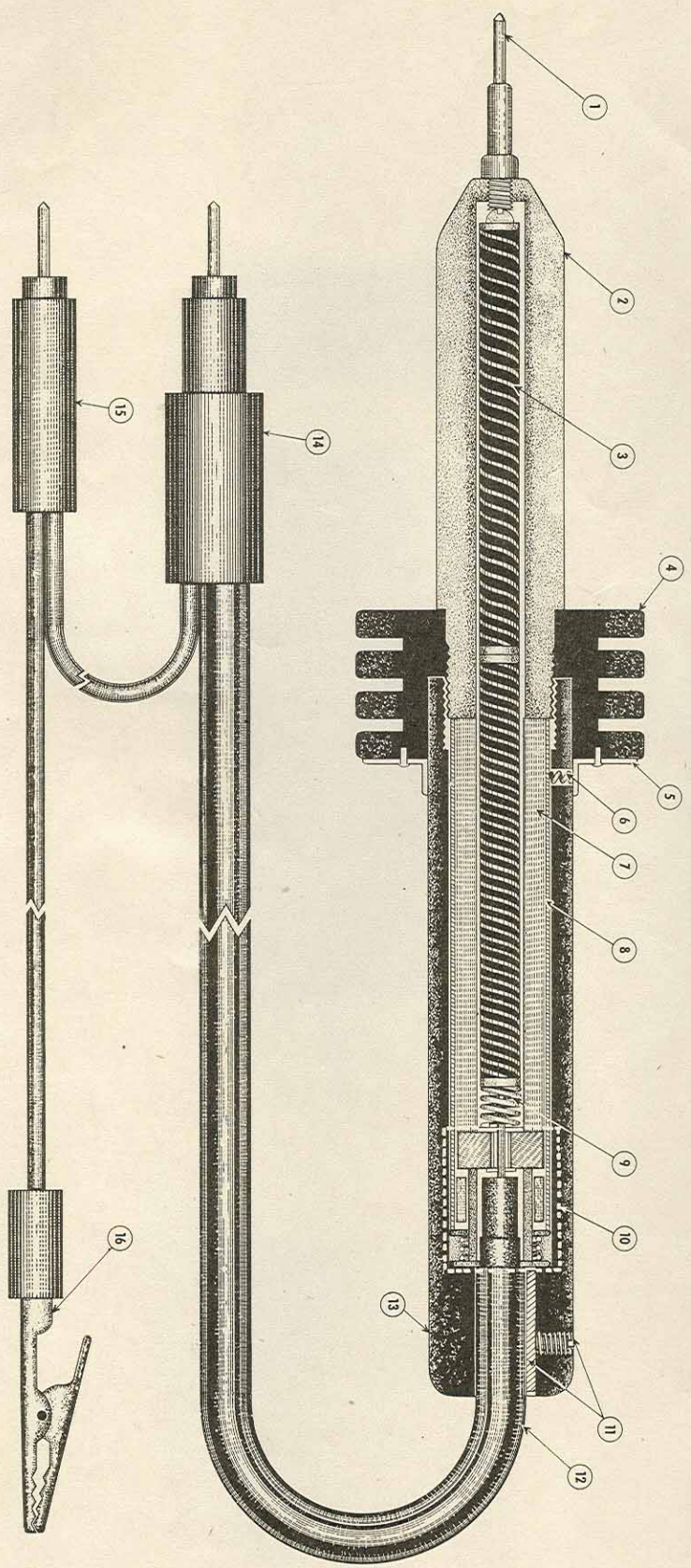
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Precision

HIGH VOLTAGE MULTIPLIER PROBE

SERIES TV



Legend

- 1 Test Tip
- 2 Polystyrene High Tension Head
- 3 Multiplier Cartridge
- 4 High Tension Leakage Barrier
- 5 Nameplate & Leakage Guard
- 6 Internal Guard Grounding Spring
- 7 Polystyrene Multiplier Insulator Sleeve
- 8 Grounded, Brass Flashover Guard Shield
- 9 Cartridge Contact — Pressure Spring
- 10 Concentric Compression Contact Assembly
- 11 Keyway Cable Fastener & Locking Screw
- 12 High Voltage Shielded Instrument Cable
- 13 Bakelite Probe Handle
- 14 Universal Stepped Test Plug
- 15 Negative Ground Plug
- 16 Safety Ground Clip

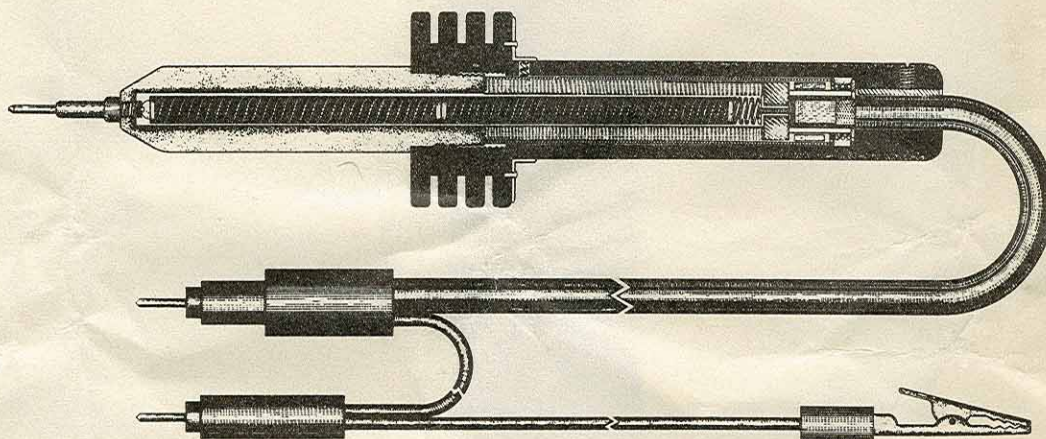
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HIGH VOLTAGE MULTIPLIER PROBE

SERIES TV



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THESE NOTES HAVE BEEN FULLY READ. HIGH
VOLTAGE CAN CAUSE SERIOUS ACCIDENTS.



PRECISION APPARATUS COMPANY, INC.

92-27 HORACE HARDING BLVD. • ELMHURST, NEW YORK

Export Division: 458 BROADWAY, NEW YORK CITY, U. S. A. • Cables: MORHANEX

Prior to the advent of modern High Voltage Television power supplies, the usual maximum voltage requirements of radio receiver circuit testing did not exceed approximately 1000 volts D.C.

However, modern large screen television has extended the high voltage operating range upwards to approximately 30,000 volts D.C.

To meet this rapidly growing need for high voltage test facilities, Precision has engineered and produced the versatile High Voltage Multiplier Probe (Series TV) which combines utmost flexibility of multiplier facilities with most extensive safety and protective features, absolutely essential when dealing with such high potentials.

A. SUMMARY OF FEATURES

1. Molded, high polished, Polystyrene Probe Head. Approximately 25,000 volts per millimeter dielectric strength. Unusually long leakage path between high voltage test point and channelled Barrier-Guard.
2. Molded, High Polished Bakelite Barrier-Guard. Extended leakage path provided thru incorporation of four radial fins on an exceptionally large diameter barrier form.
3. Corona-resistant rounded-edge probe tip.
4. Helical-film, non-hygroscopic, steatite rod type, multiplier resistance Cartridge. This spring-mounted tubular cartridge requires and employs no soldered connections. It is quickly and conveniently removed for replacement and/or substitution.
5. Grounded Safety Leakage Guard. This dual purpose identification plate and Safety Guard-ring, (grounded by means of a concealed contact spring), serves as a final and positive ground return for any unusual leakage potentials which might develop along the Head and Barrier due to operational negligence or excessive moisture. Such voltages are thereby returned to ground BEFORE reaching the operator's hand.
6. Internal Lucite Resistor Sleeve. The multiplier resistor cartridge is electrically isolated by a high dielectric, machined lucite tube.
7. Internal Brass Grounding Shield. Possibility of arc-over from multiplier resistor cartridge to operator's hand is eliminated by this concentric grounding tube providing maximum, positive isolation.
8. Concentric Compression Contact Assembly. This interacting assembly permits automatic and positive contact to Resistor cartridge, internal shield and guard ring. The polystyrene disk and tubes provide additional high dielectric protection at the instrument end of the probe handle.
9. Setscrew-Locked, Keyway-Block Cable Fastener - insures fool-proof and permanent connecting cable anchorage.
10. Shielded Concentric Connecting Cable. Specially designed super-flexible test cable with full ground shield and overall jacket.
11. Universal Screw-on type panel Connector or, universal instrument Step-Jack. The Step-jack allows insertion into small, large and recessed type, .080" tip jacks as are usually found on standard multi-range meters. The screw-on connector mates with the majority of VTVM input connectors.
12. Alligator type safety ground clip.

B. DESCRIPTION OF APPLICATION

Modern television high voltage supplies are predominantly High voltage-low current type units. High impedance voltage measuring instruments are therefore required in order that minimum load be placed upon the power supply.

The Series TV Probe has therefore been designed for use only with 20,000 ohms per volt instruments (such as Precision series 856, 858, 85, 954, 10-54 and 654), and DC Vacuum Tube Voltmeters (typified by Precision Series EV-10, EV-10A and EV-20). The resistance value of the multiplier cartridge is such as to extend the DC voltage ranges of the above noted instruments to the required extra high voltage ranges, not exceeding 60,000 volts D.C.

IDENTIFICATION OF TV PROBE MODELS

#TV-2:- For use with all "Precision" or similar 20,000 ohm per volt multi-testers having a top range of 6000 volts D.C.

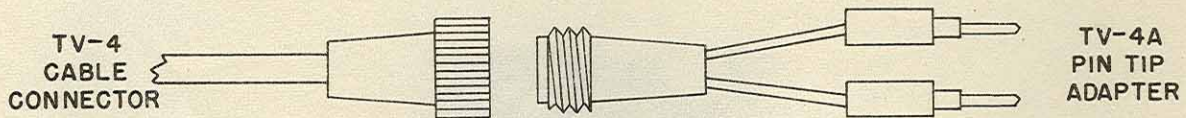
- a - Incorporates a 480 Megohms multiplier cartridge.
- b - Cable terminates in stepped connecting plug (see item 14 Page 5).
- c - Multiplies 6000 Volts D.C. range to 30,000 Volts D.C.

#TV-4:- For use with "Precision" Series EV-10A or EV-20 Vacuum Tube Voltmeters.

- a - Incorporates a 1320 Megohms multiplier Cartridge.
- b - Cable terminates in an Amphenol Connector (MC-1F) or equal.
- c - Multiplies each D.C. VTVM voltage range of selector switch by a factor of 100.

#TV-4A:- For use with "Precision" Series EV-10 Vacuum Tube Voltmeter.

The TV-4A is identical to the TV-4 with the exception that the TV-4A is supplied with a pin tip adapter to permit insertion of the cable into the pin jacks of the EV-10.



#TVP:- Same as TV-2, but supplied without multiplier cartridge.

#TVP-A:- Same as TV-4, but supplied without multiplier cartridge.

#TVP-AA:- Same as TV-4A, but supplied without multiplier cartridge.

NOTE:- Refer to the reverse side of the Precision price bulletin to select model and TVM cartridge value for use with instruments other than of "Precision" manufacture.

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C. OPERATING INSTRUCTIONS

IMPORTANT WARNING!!!

The High Potentials produced by the power supplies of modern T.V. receivers, while usually of low current capacity, can nevertheless be dangerous if sufficient care is not exercised. The following precautions should therefore be rigidly observed:

1. Hands, shoes, bench and floor must be DRY.
2. Always keep the Polystyrene Head and grooved Barrier free of accumulated dirt and/or moisture.
3. Fingers must NOT extend over or beyond the multi-grooved Barrier of the TV Probe.
4. Alligator Grounding Clip MUST be properly clipped to negative side of the high voltage power supply (usually chassis) BEFORE voltage measurements are attempted.
5. Become fully acquainted with the location of all high potential points within the device under test!
6. When testing, extreme care must be observed in order to prevent accidental contact of the hand with exposed high potential points on the chassis of the TV receiver.
7. READ AND ADHERE TO THE PUBLISHED ALIGNMENT AND TEST PROCEDURES FOR THE PARTICULAR RECEIVER TO BE REPAIRED OR TESTED.
8. Occasionally check continuity of grounding connections within the probe by use of an ohmmeter. (Apply test prods of ohmmeter to the alligator ground clip (item 16, page 5) and the outer edge of the Guard shield-nameplate). (item 5, page 5).

SEE PAGE (5) for identification of TV Probe components referenced in these instructions by item numbers.

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A - Example of Operation (TV-4, used with Precision Series EV-10A VTVM).

1. Attach the probe cable connector to the "D.C. VTVM" panel connector of the Series EV-10A.
2. Set the selectors of the EV-10A for D.C. VTVM readings.
3. If, for example 27,000 volts is to be checked, a 30,000 volts full scale range may be used. This range is obtained by setting the EV-10A range selector switch to "300". A full scale range of 300 x 100, (or 30,000 volts) is now available.
4. From published alignment and test literature for the particular T.V. set or device under consideration, locate the positive and negative polarity high voltage points.

5. Clip the black alligator-type negative test lead to the negative point of the receiver high voltage supply (usually chassis).
6. Make contact to the positive point of the High voltage supply with the TV Probe tip (item 1, page 5).
7. The Series EV-10A meter will now read on the basis of a zero-center 30,000 volts D.C. range.

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Range Multiplication using Models TV-4 or TV-4A

(Multiplies all base ranges by 100)

Model EV-10A (TV-4)		EV-20 (TV-4)		EV-10 (TV-4A)	
Selector Switch Range	H.V. Range using TV-4 Probe	Selector Switch Range	H.V. Range using TV-4 Probe	Selector Switch Range	H.V. Range using TV-4A Probe
3	300	3	300	3	300
12	1200	12	1200	6	600
60	6000	30	3000	12	1200
120	12,000	120	12,000	60	6000
300	30,000	300	30,000	300	30,000
600V.	60,000V.	1200V.	120,000V.*	600V.	60,000V.

***NOTE:** Even though the possible full scale range is 120,000 volts, the TV probe should never be employed (AT ANY TIME) to check voltages in excess of 60,000 volts.

B - Example of operation (TV-2, used with "Precision" or similar 20,000 ohms per volt multi-testers having a high range of 6000 volts D.C.)

1. Observe all previously noted Safety Precautions!
2. Insert the small black test tip (item 15 - page 5) into the negative jack of the test instrument.
3. Insert the large black stepped-plug tip (item 14, page 5) into the +6000 volts DC jack of the test instrument. For instruments that have two 6000 volt jacks, use the 20,000 ohms per volt Jack.
4. Set the selectors of the test instrument as for reading the 6000 volts D.C. high sensitivity range.
5. From published alignment and test literature for the particular T.V. set or device under consideration, locate the positive and negative polarity high voltage points.
6. Clip the black alligator-type negative test lead to the negative point of the receiver high voltage supply (usually chassis).
7. Make contact to the positive point of the High voltage supply with the TV Probe tip (item 1).
8. The meter scaleplate of the tester will be read on the basis of a 30,000 volts range. In other words the 480 Megohm cartridge of the TV-2 has extended the 6000 volt range to a new 30,000 volts range.

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D. REPLACEMENT OR REMOVAL OF MULTIPLIER CARTRIDGES.

With one hand, firmly grasp BOTH the probe handle (item 13, page 5) and the probe Barrier (item 4, page 5). Unscrew the polystyrene head (item 2, page 5) with the other hand. (If possible, do not separate the barrier from the handle:- if such happens, the small Guard spring (item 6, page 5) under the flange of the Guard-nameplate may pop out.) Insert the required multiplier cartridge, spring-end (item 9, page 5) first. Replace the polystyrene head tightly enough so that the Barrier does not rotate.

SPARE GUARD SPRING →



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E. MAINTENANCE

IMPORTANT! In all cases of suspected malfunctioning, always check the operation of the instrument or test set FIRST!

Should the source of difficulty appear to locate in the TV Probe, the following checks may be performed in the order listed:-

1. If high range ohmmeter facilities (1000 megohms or higher, as incorporated in Precision Series EV-10A V.T.V.M.) are available, check for series continuity between the Probe tip (item 1, page 5) and the step jack tip (item 14, page 5). If the probe is functioning properly, the approximate value of resistance marked on the multiplier cartridge should be obtained on the High range ohmmeter.

2. Should a high range ohmmeter be unavailable, the continuity of the multiplier cartridge and the contact connections may be checked as follows:

- a. Remove the multiplier cartridge from the probe using the procedure detailed in section D of these instructions.
- b. Short-circuit the cartridge by connecting a length of fine wire (approximately No. 32 Gauge) between the screws at either end of the cartridge. Re-insert the cartridge into the Probe, and replace the polystyrene Head.
- c. Check the Probe for continuity as outlined in Step 1 above, using a low range ohmmeter. If short circuit or zero ohms reading is obtained (and the Probe does not yield proper indications with normal usage), then the cartridge is probably open-circuited and requires replacement. If no short circuit is obtained (using the short-circuit cartridge, then an open circuit in the cabling connections probably exists.

In any case of apparently defective operation of the probe, do not attempt any check or repairs other than detailed above. - - Neglect in insuring continuity of all grounded connections can nullify the effect of the carefully designed safety provisions provided in your Series TV Probe.

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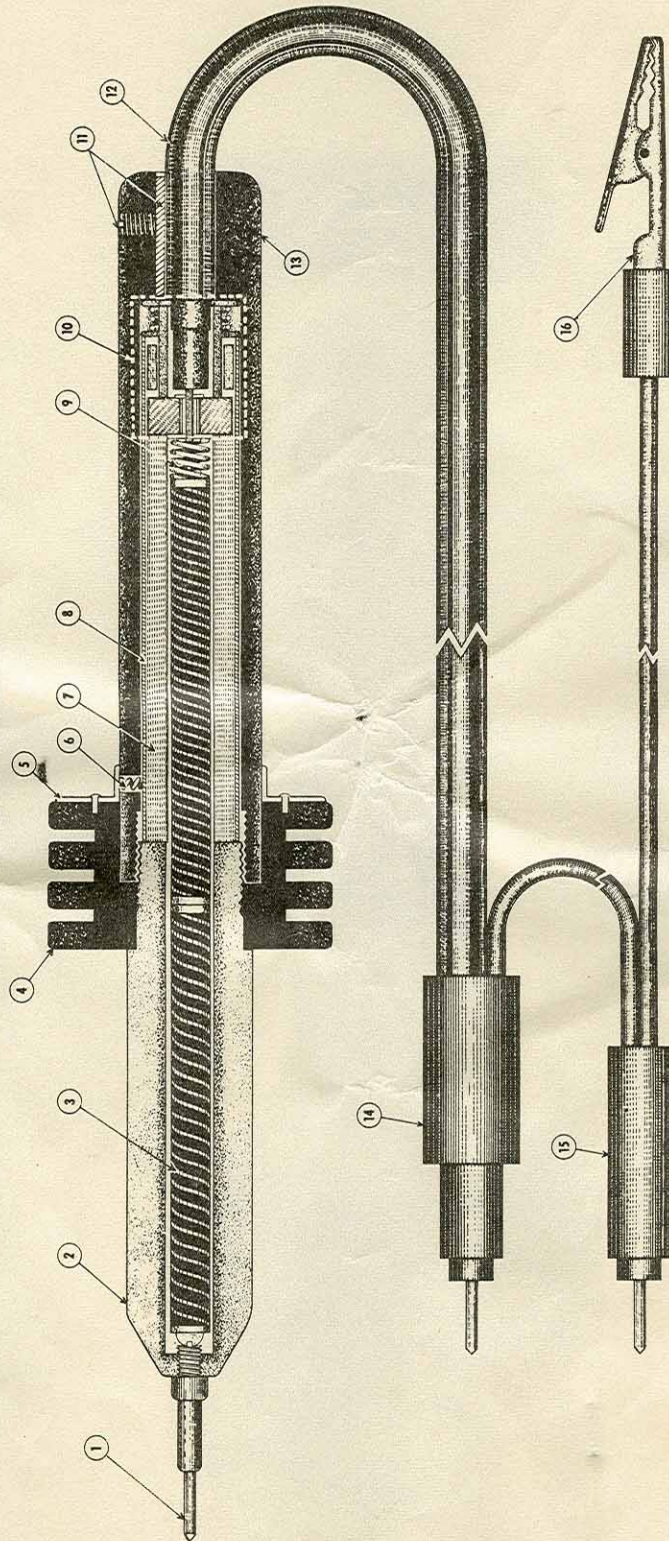
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Precision

HIGH VOLTAGE MULTIPLIER PROBE

SERIES TV



Legend

- | | | | |
|---------------------------------|---|--|--------------------------------|
| 1 Test Tip | 5 Nameplate & Leakage Guard | 9 Cartridge Contact - Pressure Spring | 13 Bakelite Probe Handle |
| 2 Polystyrene High Tension Head | 6 Internal Guard Grounding Spring | 10 Concentric Compression Contact Assembly | 14 Universal Stepped Test Plug |
| 3 Multiplier Cartridge | 7 Polystyrene Multiplier Insulator Sleeve | 11 Keyway Cable Fastener & Locking Screw | 15 Negative Ground Plug |
| 4 High Tension Leakage Barrier | 8 Grounded, Brass Flashover Guard Shield | 12 High Voltage Shielded Instrument Cable | 16 Safety Ground Clip |