

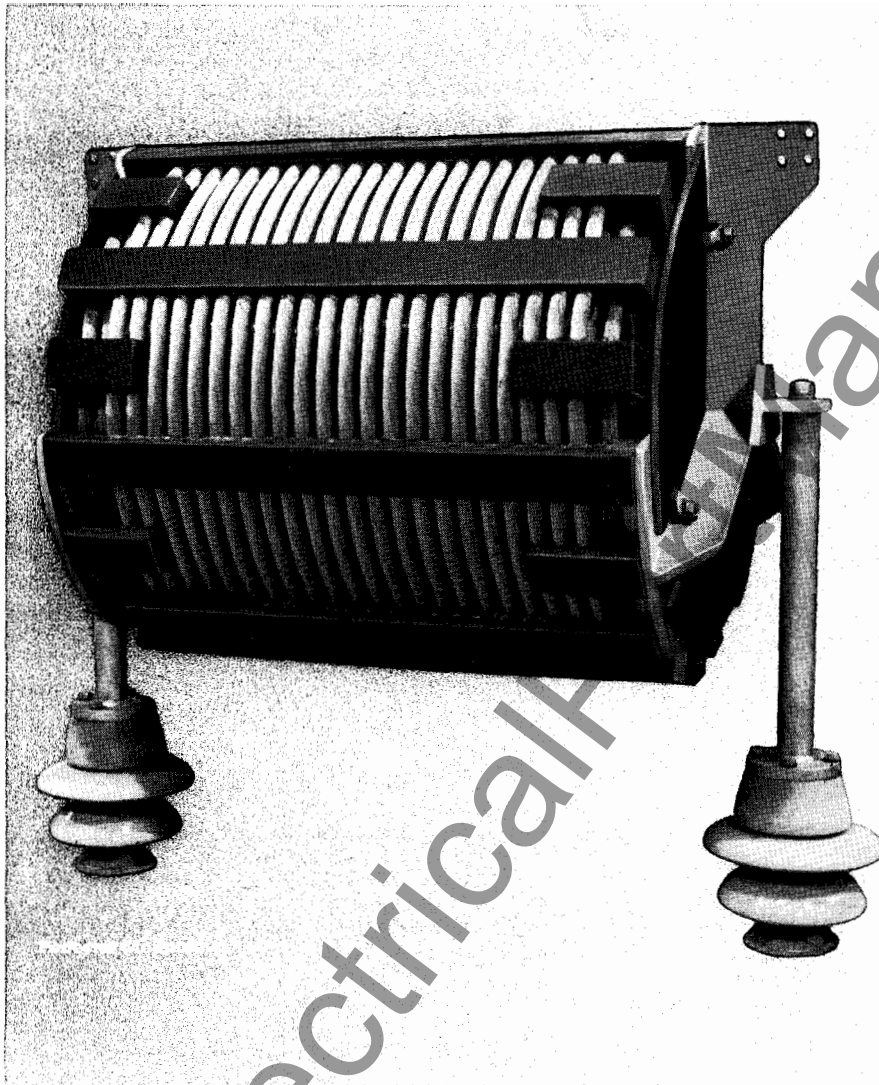
Westinghouse



Line Traps

Types MS, MD and MW

For Power Line Carrier Applications
 400-3000 Amps
 Single, Double and Wide Band Tuning
 Pedestal or Suspension Mounting



Advantages

Maximum Strength: The molded bar construction with sturdy mounting assembly provides a trap capable of withstanding very high mechanical forces during faults. The bars serve to hold the coil absolutely rigid, preventing any sag over time, which could reduce the short-circuit withstand ability of the line traps. The multi-layer aluminum coil design reduces diameter and length to a minimum while maintaining optimum strength to weight ratio.

Liberal Inductance: The inductance chosen for all ratings provides excellent characteristics for all frequency ranges.

Adequate Frequency Range: They provide complete coverage of all frequencies in the generally accepted range of 30 to 300 KHz.

Simplified Tuning: Tuning unit and circuit arrangement provide easy tuning to any desired channel without removing the tuning units. No instruments are needed for most tuning requirements.

All Aluminum[Ⓢ]: The multi-layer coil is welded directly to the aluminum current-carrying end brackets, thereby eliminating contact resistance. Use of aluminum achieves reduced weight plus resistance to weathering.

[Ⓢ] Galvanized, non-magnetic steel end brackets are used for 2000 ampere traps.

Application

The Westinghouse type M line trap is a resonated inductance for use in power lines over which carrier channels have been established. They present a high impedance to the carrier frequency, or band of frequencies, while the impedance at power frequency is negligible.

They increase the effective range of carrier equipment by reducing the loss of carrier power in connected lines or networks not being used for carrier communication or relaying. The type M line trap will permit normal carrier operation when these lines or networks are grounded for 60 cycle power. Interference is reduced between carrier

channels, and the reliability of carrier channels is assured even under adverse conditions caused by short circuits, grounds or switching phenomena on connected lines.

The type MS trap can be tuned to block a single frequency of any value within its designated frequency range. The type MD trap can be tuned to block two frequencies within its range, provided they are separated by at least 25 kc, or 25% of the higher frequency, whichever is greater.

The type MW trap is factory tuned to block all frequencies in the "wide band" range (90 to 200 kc) with a minimum impedance of 400 ohms over this entire band width.

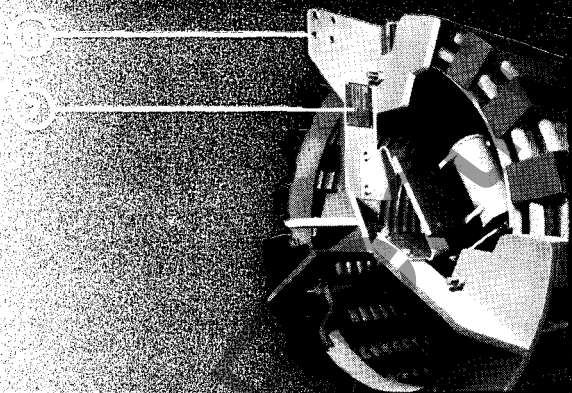
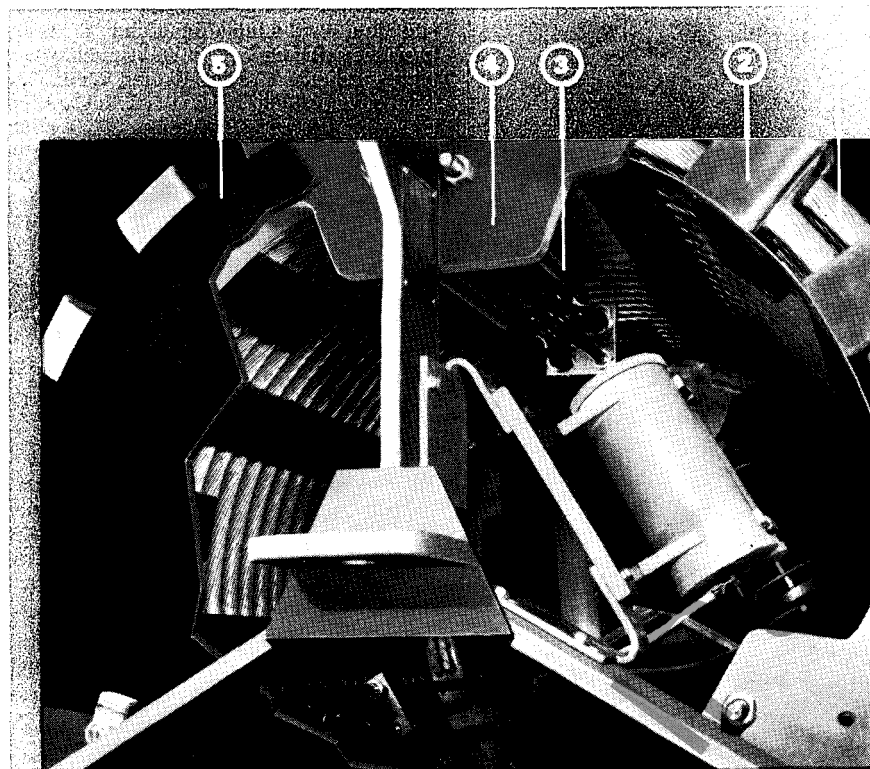
March, 1971

Supersedes DB 39-641 pages 1-8,
 dated October, 1966
 E, D, C/2003/DB

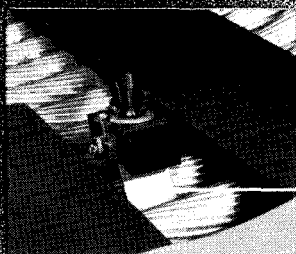
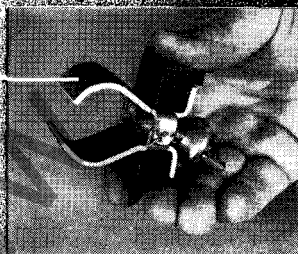
Westinghouse



Design Features



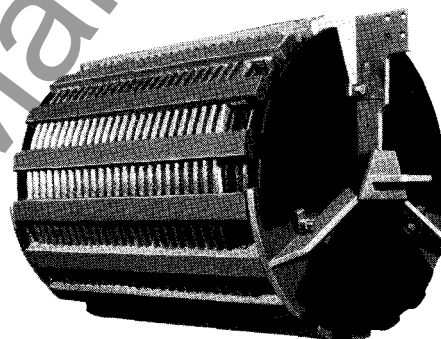
400-1600 Ampere
Ratings—Aluminum
Cable Construction



Power Current Coil

Sturdy construction, plus high strength and rigidity during conditions of flow of system fault current are features of the main, or power current, coil. 400 ampere line traps are wound with multiple layers of aluminum bar in parallel.

800 ampere and higher rated line traps are wound with parallel layers of stranded aluminum cable. Stranded cable is used for these line traps to reduce their eddy current losses.



2000 Ampere Rating—Aluminum Cable Construction (shown with bird guards)

Molded Design

The coil structure is supported by a liberal number of spacing bars which provide positive conductor separation. These spacing bars are molded from a special thermosetting polyester resin compound developed for this purpose. High dielectric strength, high mechanical strength, low dielectric loss, together with excellent weather resistance are the proven properties of this resin over long periods and for a running temperature range of -40°C to $+125^{\circ}\text{C}$. The mechanical strength is approximately five times that of concrete.

Strain Members

Strain members hold the end bracket in compression relative to the coil structure. Porcelain insulators are incorporated in the strain members of all line traps. These insulators will withstand all mechanical and electrical stress conditions associated with fault currents. The insulators also serve to isolate the end frames from each other. A completely assembled line trap has many times the strength necessary for service when either pedestal or suspension mounted.

End Brackets

The molded coil assembly is welded between two heavy gauge aluminum end brackets. These end brackets serve as:

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1. Support for main coil.
 2. Lifting means.
 3. Supporting structure.
 4. Terminal pad.
 5. Connection point for strain members.
 6. Support for the tuning units.
- By welding the end bracket to the main coil, the possibility for contact resistance is eliminated.

Bird Barriers

Bird barriers, held by captive hardware, prevent the entrance of objects which might cause short circuit of the coil turns.

Terminal Connections

Line terminals are attached directly to the heavy end brackets so that the short circuit forces in the line connections cannot be transmitted to the actual coil conductors or molded bars which hold them in position. Four symmetrically spaced mounting holes are provided to permit connections to be attached in line with the trap axis or 90 degrees to it.

Nameplates

Nameplates mounted directly on the end brackets give all necessary information on the trap and tuning units.

Trimmer Connector

To simplify the task of fine tuning a trap after it has been mounted, a trimmer wire connector is included that:

1. Can be manipulated, positioned and tightened with one hand.
2. Maintains necessary contact pressure without solder or wire clamps.
3. Can be readjusted at any time.

Mounting

Simple mounting is accomplished by the use of the sturdy end brackets, which support the trap on pedestals. The pedestals can be rotated to accommodate bolt center lines of the supporting insulators. The terminal pads are sufficiently strong to serve also as lifting lugs while lowering the trap into mounting position. In suspension mounting, the cables may be attached directly to the end brackets. It is quite common to mount one pedestal of the line trap on top of the coupling capacitor. See DB 39-611 or 39-621, whichever type coupling capacitor is applicable.

Tuning Units



Typical S, D1 and D2 tuners.

Type of Tuners

Each single frequency line trap contains one "S" tuner. In addition to the "S" tuner, each double frequency line trap contains one "D-1" and one "D-2" tuner. Wide band line traps contain two ("W") tuners. In addition, each line trap also contains a lightning arrester. All are similar in appearance to those shown above.

Tuning packs are located inside the main line trap coil and at one end for easy access. Mounting boards bolted to each end frame are used for mounting the tuning packs. The mounting boards are drilled with slotted holes to simplify installation of the tuning packs. The hardware which holds the tuning packs to the mounting boards is captive to prevent it from accidentally being dropped into the main coil where it could cause damage. In addition to the tuning packs, the lightning arrester and, when specified, de-Qing resistors are located on the mounting boards.

All connection among tuning components and to the main coil are made with flexible copper leads. All connections other than the tuning clamp are made to tin plated silicon bronze studs.

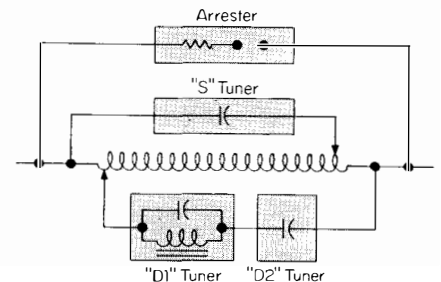
Construction

Tuning pack capacitors have a completely dry dielectric system. Capacitor sections are built up using electrical grade aluminum foil and a synthetic film. These sections are then stacked in series to obtain the correct capacitance and voltage withstand value, placed inside a spun fiberglass cylinder and potted. The combination of the fiberglass housing and potting compound protect the capacitor from shipping and handling damage as well as weathering. The adjustable inductor which is used in double frequency and wide band line traps is also potted and housed in a fiberglass cylinder.

Lightning Arrester

Protection against overvoltage is afforded by a hermetically sealed lightning arrester. This arrester uses a solder sealing system that is far superior to conventional gasket seals, which can age, compress, and permit entrance of moisture, resulting in eventual arrester failures.

The arrester is chosen, so that, it will not sparkover during rated short circuit current but will protect the tuning components against traveling waves on the line due to switching or lightning surges.



High "Q" double frequency line trap schematic. Single frequency line traps use only the S tuner and lightning arrester. Low "Q" single frequency line traps have a resistor in series with the S tuner, low "Q" double frequency line traps have resistors in series with the S and D2 tuners.

Tuning

Tuning is easily accomplished by connecting the capacitor units in series or parallel combinations. Connections between tuning elements are made with flexible copper leads. Double frequency and wide band line traps also use an adjustable indicator which is adjusted with a screw driver after removing the protective cover. In addition, tuning clamps are used to connect the tuning packs to the main coil and to tap the coil to obtain the correct values of inductance.

Versatility results from using the same tuners for all line traps except the 30-90 KHz 800 ampere and the 400 ampere ratings.

Westinghouse



Impedance

Typical impedance curves for the various frequency ranges are shown on these two pages and apply for all current ratings. These curves show that, for types MS and MD traps, with ranges of either 50-150 kc or 70-200 kc, the minimum impedance over a band width of $\pm 5\%$ of each resonant frequency is 400 ohms. For Types MS and MD traps with a range of 30-90 kc, this 400 ohm minimum impedance is held for a band width of $\pm 2\%$ of the resonant frequency.

Double Frequency Traps: The two frequencies to which a double frequency trap is tuned shall be spaced at least 25 kc or 25% of the higher frequency, whichever is greater; closer spacing will result in loss of impedance.

Single Frequency Traps: The impedance of single frequency traps will be at least twice the impedance of double frequency traps for the same frequency. This is apparent by comparing the curves at right.

Wide Band Traps: These are applied where it is desired to block all carrier frequencies. The MW wide band traps need no field tuning; they are factory tuned to block all frequencies with a minimum impedance of 400 ohms.

Frequency Range

NEMA standard frequency ranges for both single and double frequency traps are 30-90, 50-150 and 70-200 kc. For other frequency ranges, refer to Westinghouse.

Inductance

All line traps are rated .265 millihenries inductance $\pm 5\%$ at 100 KHz.

Single Frequency Type MS

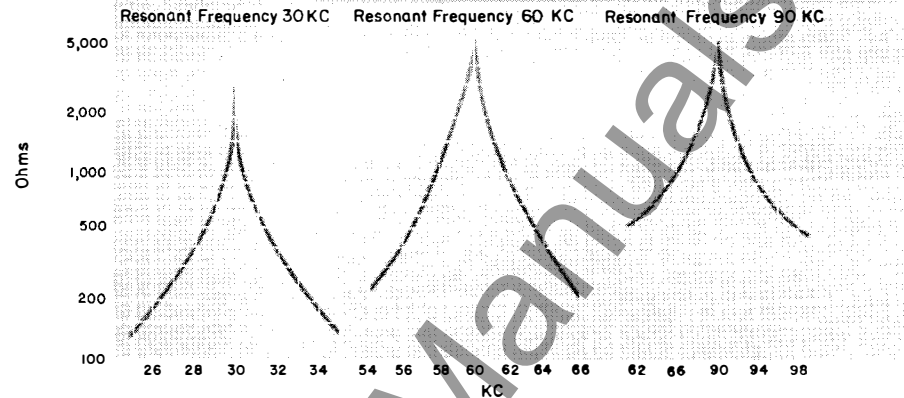


Fig. 1 Typical Impedance Values 30-90 Kc Single Frequency Type MS Traps

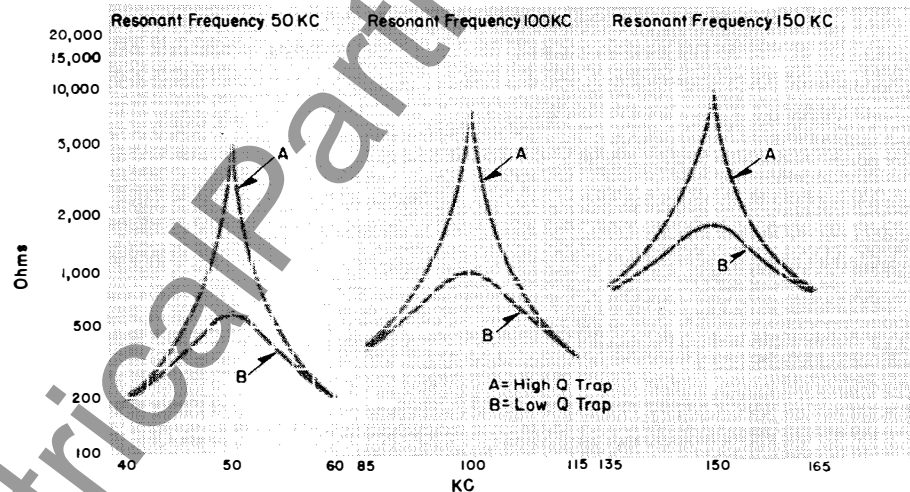


Fig. 2 Typical Impedance Values 50-150 Kc Single Frequency Type MS Traps

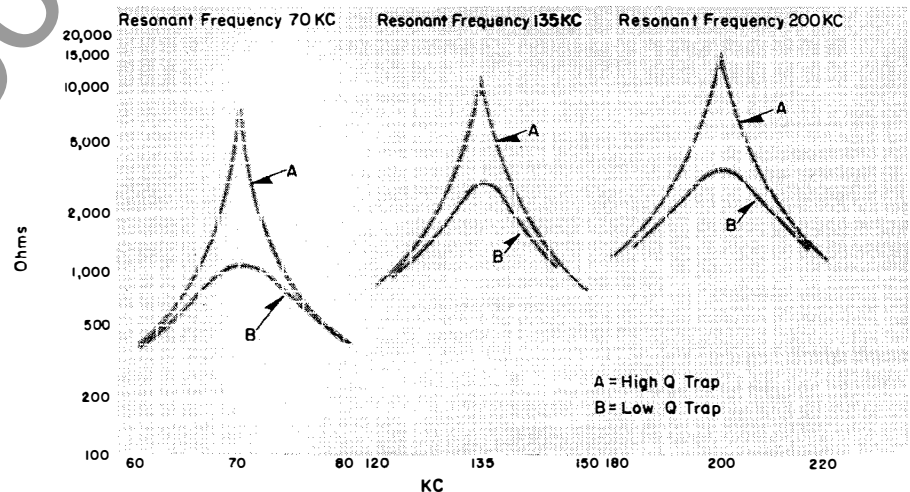


Fig. 3 Typical Impedance Values 70-200 Kc Single Frequency Type MS Traps

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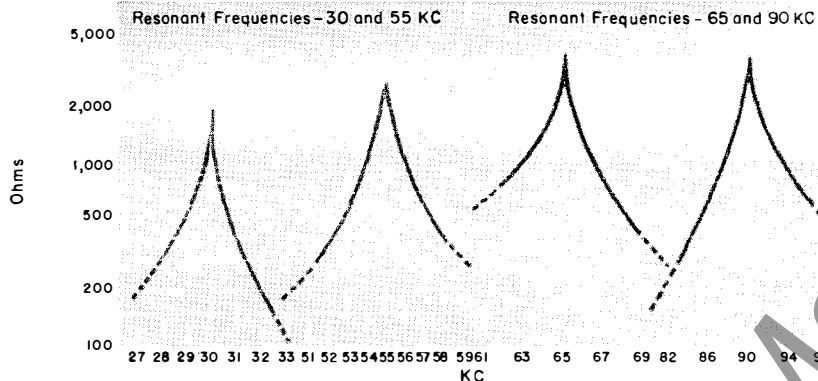
Double Frequency Type MD

Fig. 4 Typical Impedance Values 30-90 Kc Double Frequency Type MD Traps

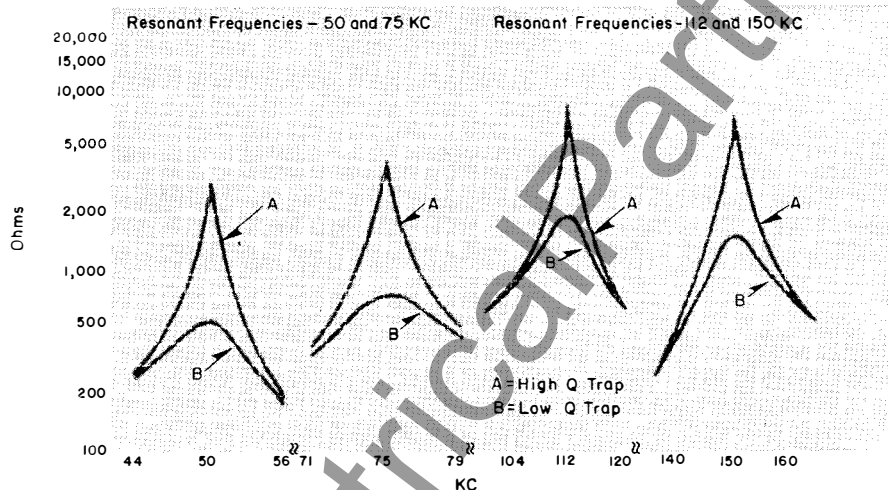


Fig. 5 Typical Impedance Values 50-150 Kc Double Frequency Type MD Traps

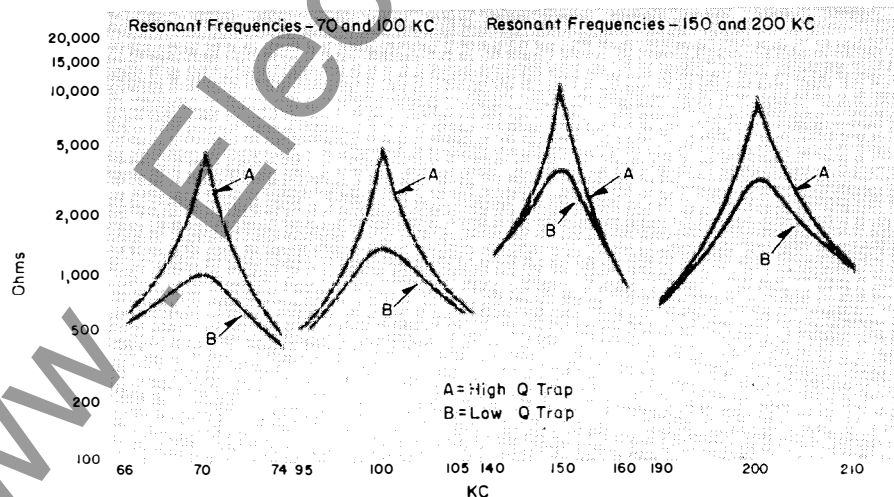
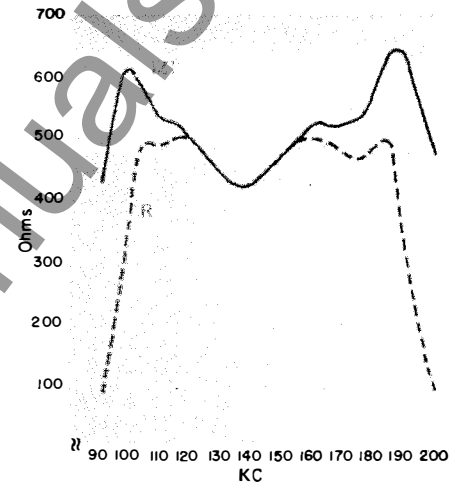


Fig. 6 Typical Impedance Values 70-200 Kc Double Frequency Type MD Traps

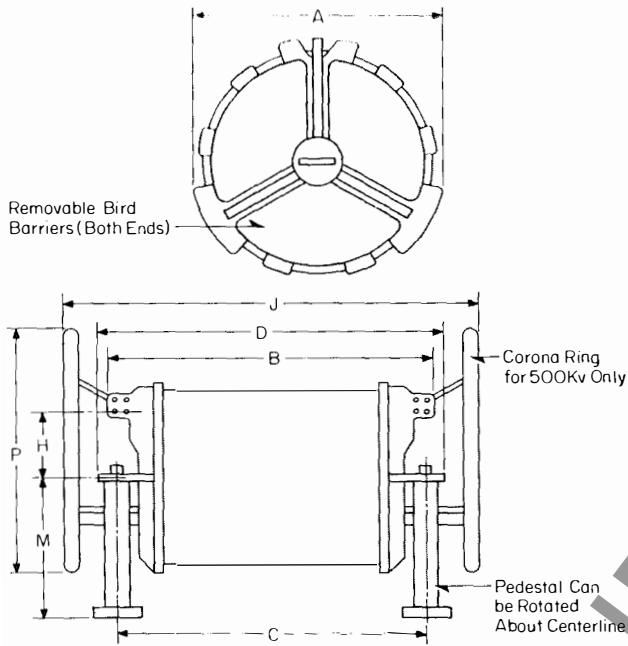
Wide Band Type MWFig. 7 Typical Impedance Values $|Z|$, and Resistive Component R for Type MW traps

Westinghouse

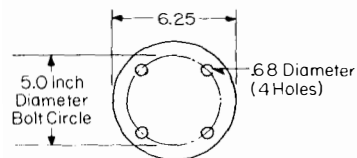


Dimensions in Inches (Approx.)

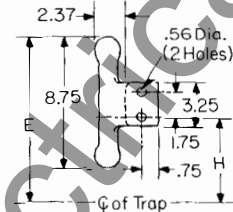
400, 800, 1200, 1600 and 2000 Ampere



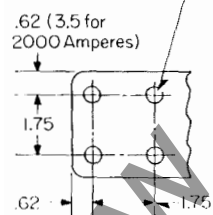
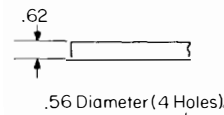
Pedestal Mounting Dimensions



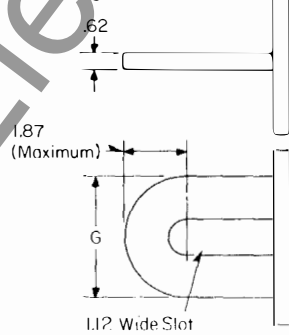
Corona Shield 230 and 345 Kv



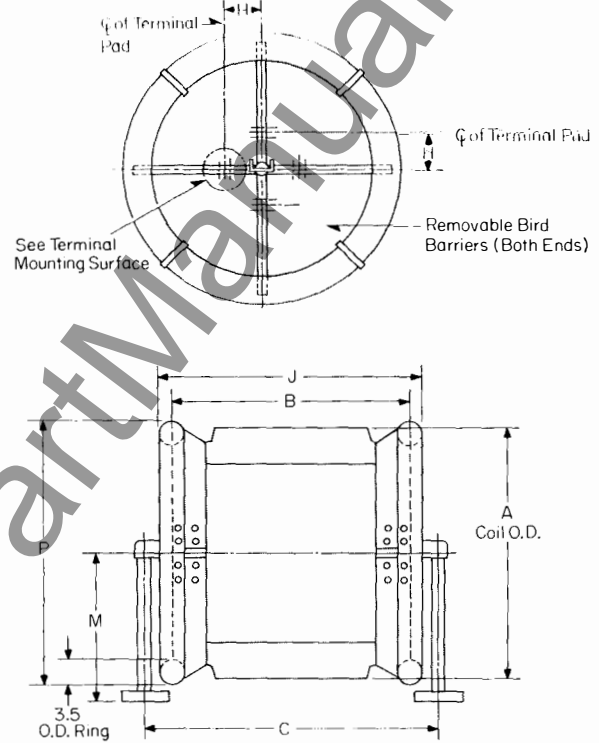
Terminal Pad



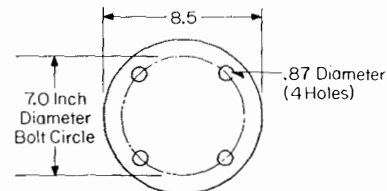
Mounting Lug



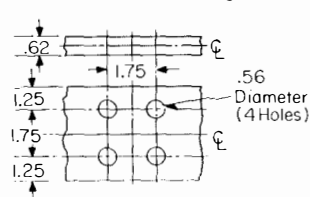
3000 Amperes



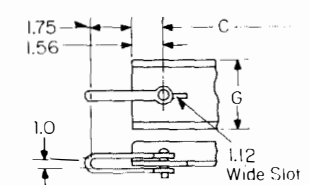
Pedestal Mounting Dimensions



Terminal Pad Mounting Surface



Suspension Mounting (Vertical)



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Selector Guide

Rating Contin- uous Rms Amperes	Short Time Rating Rms Am- peres ^①	Type: Single or Double Frequency or Wide Band	Frequency Range Kilocycles	Style Number	Approx. Wt., Lbs.		Dimensions: Inches (Approx)											
					Net	Ship- ping	M	A	B	C	D	E	F	G	H	J	P	
400	15000	MS	30- 90 50-150 70-200	506D400A01 506D400A02 506D400A03	225	300												
		MD	30- 90 50-150 70-200	506D400A05 506D400A06 506D400A07	255	330	16.31	22.00	38.38	35.31	39.38	13.12	43.19	4.00	7.88	51.00	29.50	
		MW	90-200	506D400A10	225	300												
800	20000	MS	30- 90 50-150 70-200	634A033A01 634A033A02 634A033A03	400	475												
		MD	30- 90 50-150 70-200	634A033A05 634A033A06 634A033A07	430	505	16.31	28.19	45.12	42.00	47.12	16.50	49.94	5.50	11.25	57.75	35.50	
		MW	90-200	634A033A10	400	475												
1200	36000	MS	30- 90 50-150 70-200	634A034A01 634A034A02 634A034A03	675	775												
		MD	30- 90 50-150 70-200	634A034A05 634A034A06 634A034A07	705	805	18.31	34.00	50.88	47.50	52.38	19.06	55.69	5.50	13.81	63.50	39.50	
		MW	90-200	634A034A10	675	775												
1600	44000	MS	30- 90 50-150 70-200	634A035A01 634A035A02 634A035A03	1055	1155												
		MD	30- 90 50-150 70-200	634A035A05 634A035A06 634A035A07	1085	1185	24.19	37.25	54.88	53.00	57.12	21.06	59.69	5.50	15.81	67.50	44.00	
		MW	90-200	634A035A10	1055	1155												
2000	63000	MS	30- 90 50-150 70-200	506D400A71 506D400A72 506D400A73	1450	1575												
		MD	30- 90 50-150 70-200	506D400A75 506D400A76 506D400A77	1480	1605	30.00	41.12	66.75	60.62 Min. to 63.38 Max. ②	66.12	21.06	71.56	5.50	15.81	79.38	56.62	
		MW	90-200	506D400A80	1450	1575												
3000	63000	MS	30- 90 50-150 70-200	634A301A01 634A301A02 634A301A03	1600	1725												
		MD	30- 90 50-150 70-200	634A301A05 634A301A06 634A301A07	1630	1755	37.69	54.60	46.56	55.06 Min. to 58.31 Max. ②	5.75	6.5 or 9.0	53.56	55.50	
		MW	90-200	634A301A10	1600	1725												

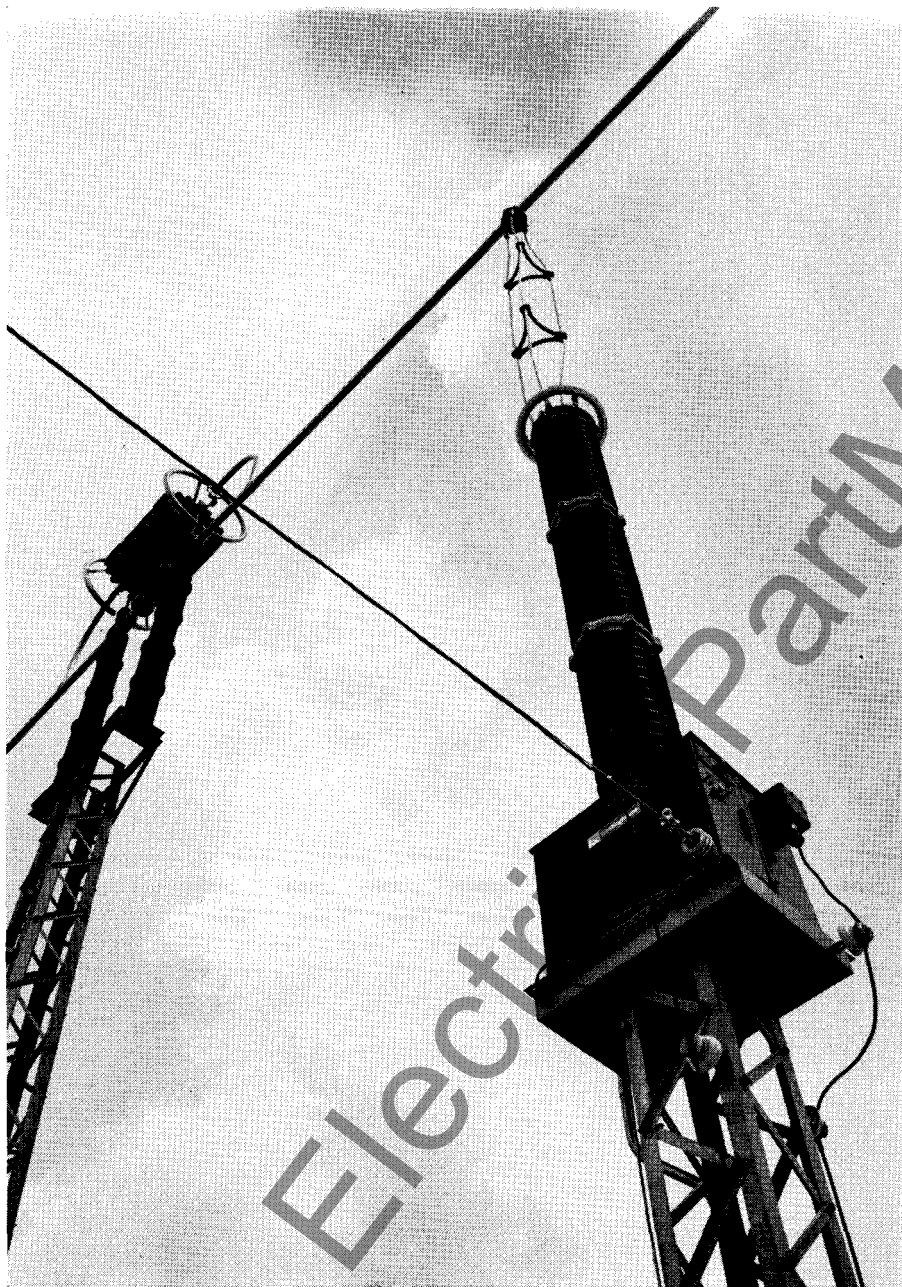
① These values are symmetrical rms amperes and may be applied for 2 seconds or may be applied fully offset resulting in peak currents having crest values of 2.83 times these values.

② Adjustable between these limits.

Line Traps

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2000 ampere, 500 kv Westinghouse Type MS Line Trap installation is shown with pedestal mounting. At right in the photograph is a 500 kv PCM metering accuracy capacitive potential device, equipped with carrier accessories.

Further Information

Prices: PL 39-710, PL 41-021

Descriptive: DB 39-715

Westinghouse Electric Corporation

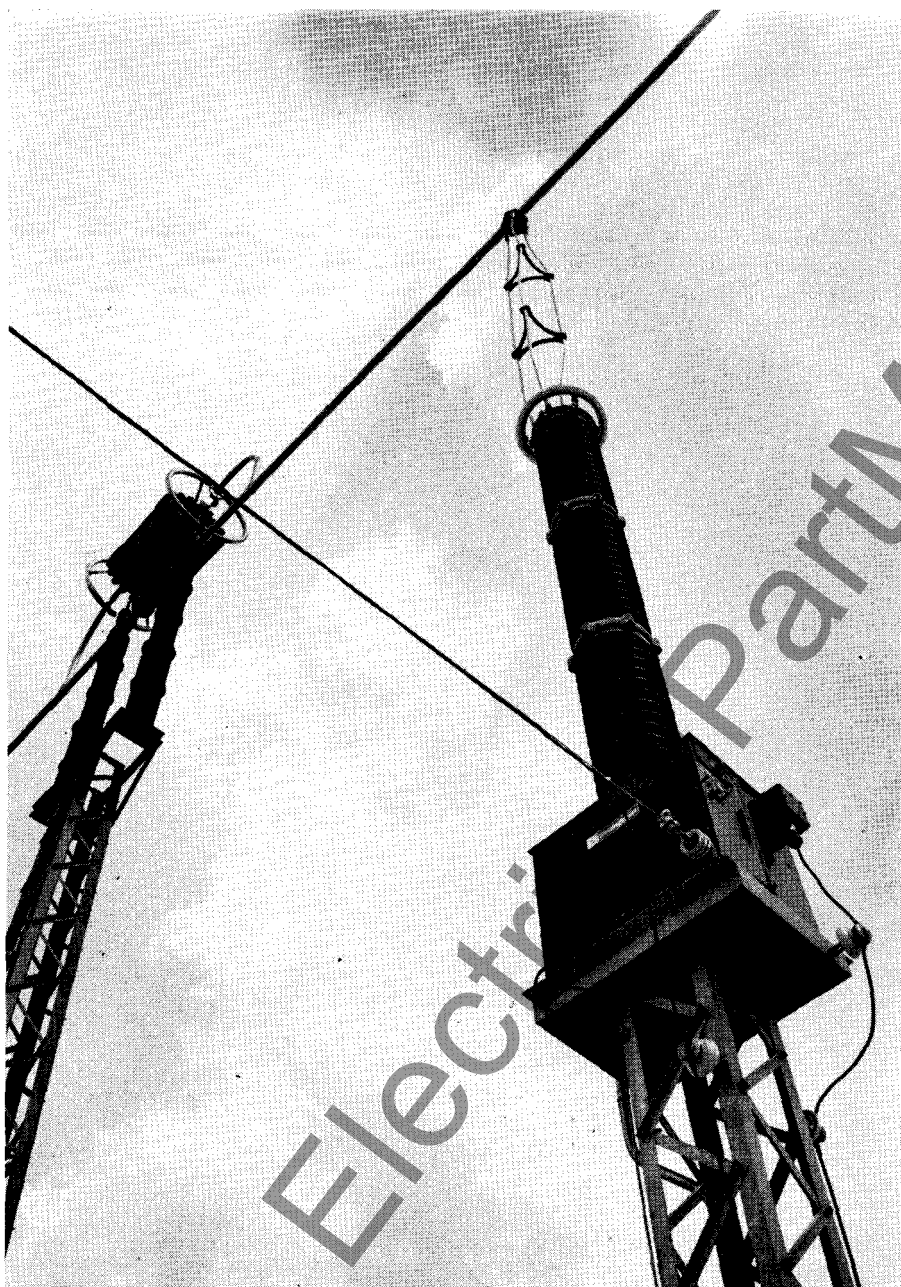
Distribution Apparatus Division: Bloomington, Ind. 47401

Printed in USA

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		MW	90-200	506D400A10	225	300												
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		MW	90-200	634A033A10	400	475												
1200	36000	MS	30- 90 50-150 70-200	634A034A01 634A034A02 634A034A03	675	775												
		MD	30- 90 50-150 70-200	634A034A05 634A034A06 634A034A07	705	805	18.31	34.00	50.88	47.50	52.38	19.06	55.69	5.50	13.81	63.50	39.50	
		MW	90-200	634A034A10	675	775												
1600	44000	MS	30- 90 50-150 70-200	634A035A01 634A035A02 634A035A03	1055	1155												
		MD	30- 90 50-150 70-200	634A035A05 634A035A06 634A035A07	1085	1185	24.19	37.25	54.88	53.00	57.12	21.06	59.69	5.50	15.81	67.50	44.00	
		MW	90-200	634A035A10	1055	1155												
2000	63000	MS	30- 90 50-150 70-200	506D400A71 506D400A72 506D400A73	1450	1575												
		MD	30- 90 50-150 70-200	506D400A75 506D400A76 506D400A77	1480	1605	30.00	41.12	66.75	60.62 Min. to 63.38 Max. ②	66.12	21.06	71.56	5.50	15.81	79.38	56.62	
		MW	90-200	506D400A80	1450	1575												
3000	63000	MS	30- 90 50-150 70-200	634A301A01 634A301A02 634A301A03	1600	1725												
		MD	30- 90 50-150 70-200	634A301A05 634A301A06 634A301A07	1630	1755	37.69	54.60	46.56	55.06 Min. to 58.31 Max. ②	5.75	6.5 or 9.0	53.56	55.50	
		MW	90-200	634A301A10	1600	1725												

① These values are symmetrical rms amperes and may be applied for 2 seconds or may be applied fully offset resulting in peak currents having crest values of 2.83 times these values.

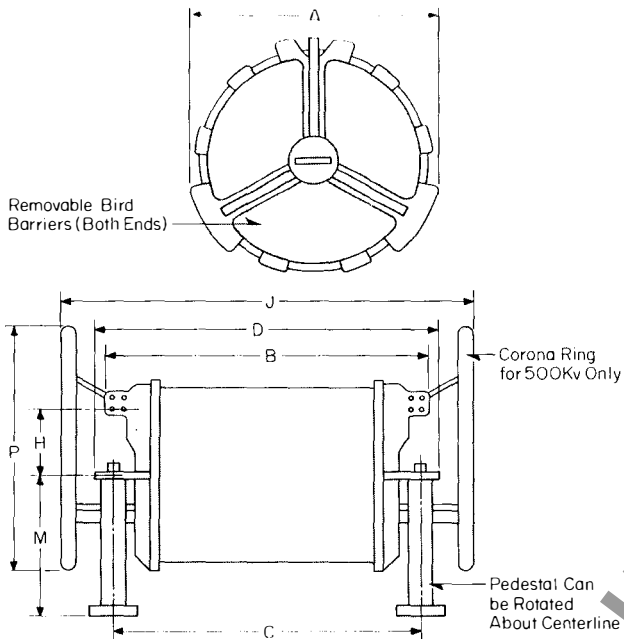
② Adjustable between these limits.

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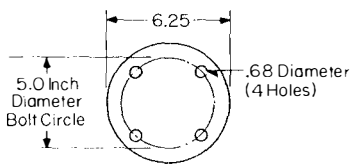


Dimensions in Inches (Approx.)

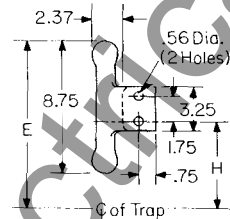
400, 800, 1200, 1600 and 2000 Ampere



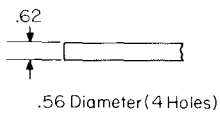
Pedestal Mounting Dimensions



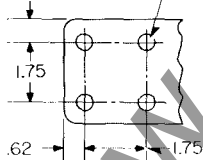
Corona Shield 230 and 345 Kv



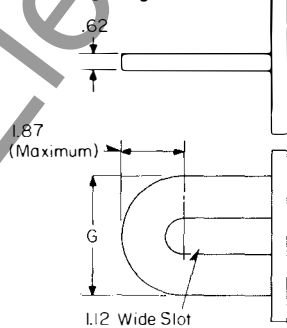
Terminal Pad



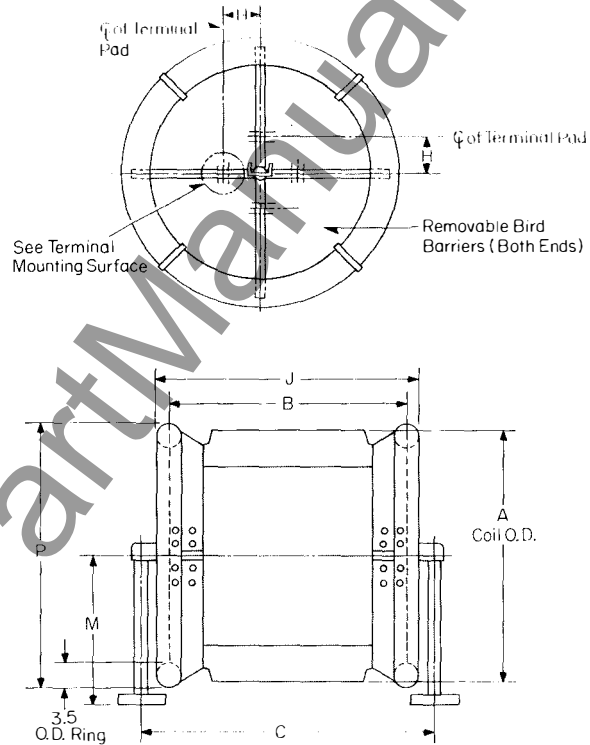
.62 (3.5 for 2000 Amperes)



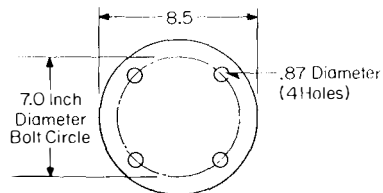
Mounting Lug



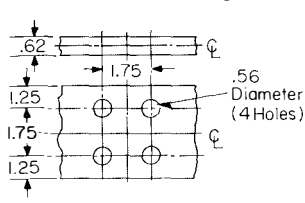
3000 Amperes



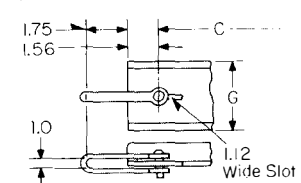
Pedestal Mounting Dimensions



Terminal Pad Mounting Surface



Suspension Mounting (Vertical)



Line Traps

Types MS, MD and MW

For Power Line Carrier Applications
 400-3000 Amps
 Single, Double and Wide Band Tuning
 Pedestal or Suspension Mounting

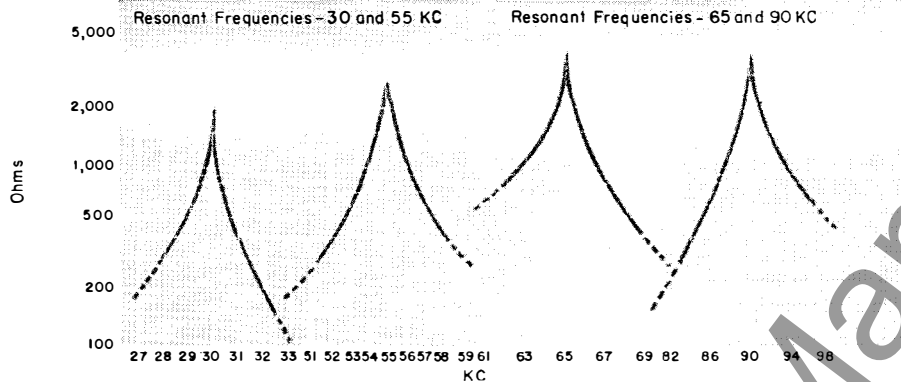
Double Frequency Type MD

Fig. 4 Typical Impedance Values 30-90 Kc Double Frequency Type MD Traps

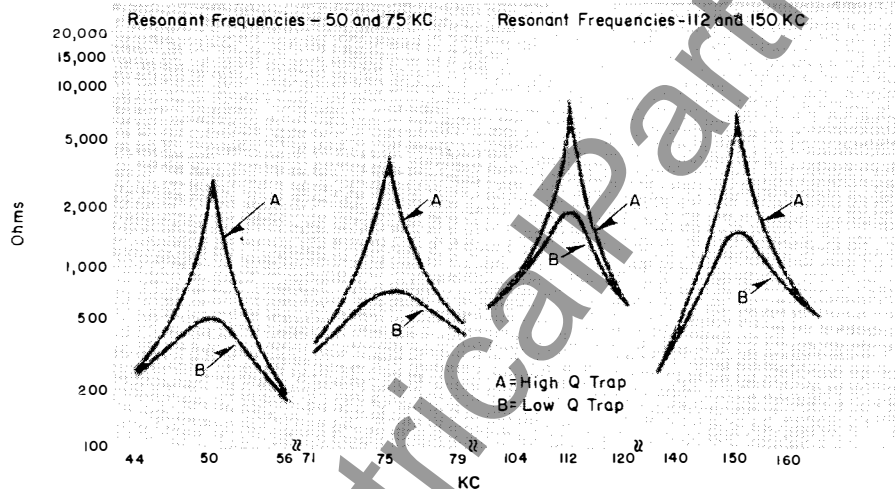


Fig. 5 Typical Impedance Values 50-150 Kc Double Frequency Type MD Traps

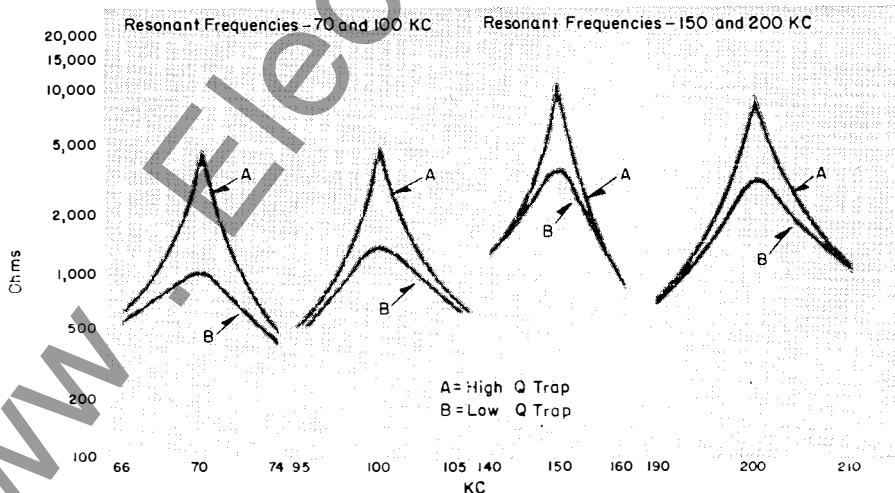
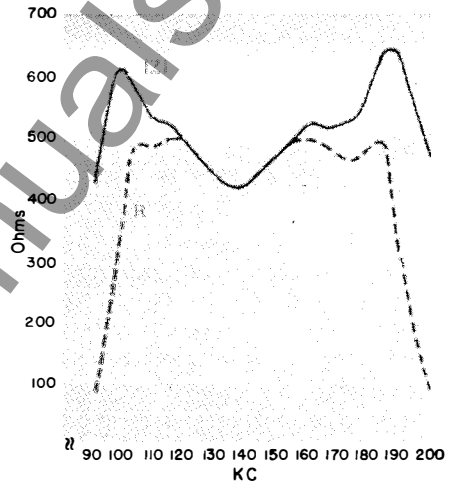


Fig. 6 Typical Impedance Values 70-200 Kc Double Frequency Type MD Traps

Wide Band Type MWFig. 7 Typical Impedance Values $|Z|$, and Resistive Component R for Type MW traps

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Impedance

Typical impedance curves for the various frequency ranges are shown on these two pages and apply for all current ratings. These curves show that, for types MS and MD traps, with ranges of either 50-150 kc or 70-200 kc, the minimum impedance over a band width of $\pm 5\%$ of each resonant frequency is 400 ohms. For Types MS and MD traps with a range of 30-90 kc, this 400 ohm minimum impedance is held for a band width of $\pm 2\%$ of the resonant frequency.

Double Frequency Traps: The two frequencies to which a double frequency trap is tuned shall be spaced at least 25 kc or 25% of the higher frequency, whichever is greater; closer spacing will result in loss of impedance.

Single Frequency Traps: The impedance of single frequency traps will be at least twice the impedance of double frequency traps for the same frequency. This is apparent by comparing the curves at right.

Wide Band Traps: These are applied where it is desired to block all carrier frequencies. The MW wide band traps need no field tuning; they are factory tuned to block all frequencies with a minimum impedance of 400 ohms.

Frequency Range

NEMA standard frequency ranges for both single and double frequency traps are 30-90, 50-150 and 70-200 kc. For other frequency ranges, refer to Westinghouse.

Inductance

All line traps are rated .265 millihenries inductance $\pm 5\%$ at 100 KHz.

Single Frequency Type MS

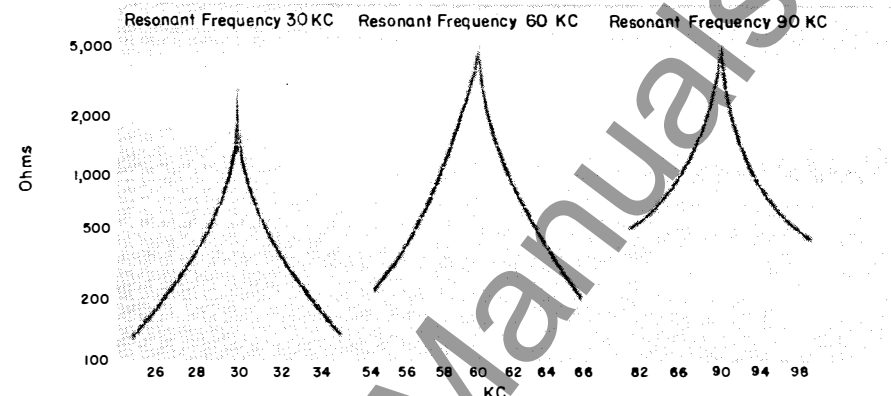


Fig. 1 Typical Impedance Values 30-90 Kc Single Frequency Type MS Traps

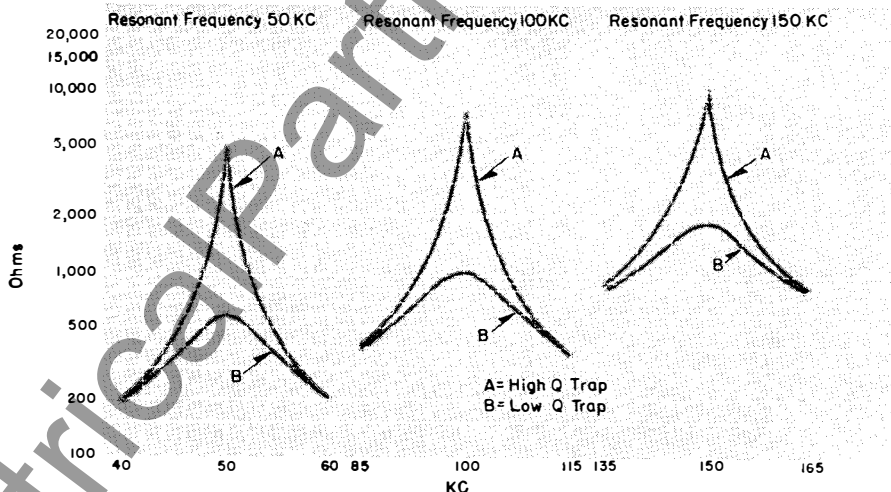


Fig. 2 Typical Impedance Values 50-150 Kc Single Frequency Type MS Traps

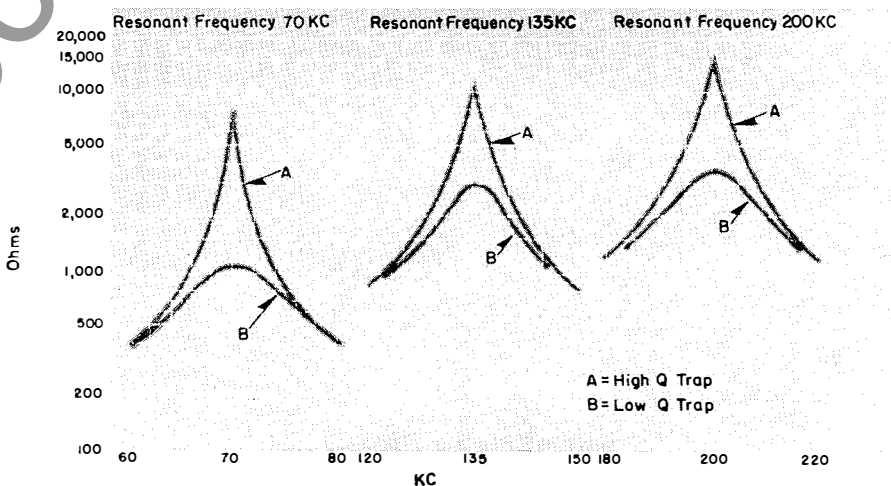


Fig. 3 Typical Impedance Values 70-200 Kc Single Frequency Type MS Traps

Line Traps

Types MS, MD and MW

For Power Line Carrier Applications
400-3000 Amps
Single, Double and Wide Band Tuning
Pedestal or Suspension Mounting

1. Support for main coil.
 2. Lifting means.
 3. Supporting structure.
 4. Terminal pad.
 5. Connection point for strain members.
 6. Support for the tuning units.
- By welding the end bracket to the main coil, the possibility for contact resistance is eliminated.

1 Bird Barriers

Bird barriers, held by captive hardware, prevent the entrance of objects which might cause short circuit of the coil turns.

2 Terminal Connections

Line terminals are attached directly to the heavy end brackets so that the short circuit forces in the line connections cannot be transmitted to the actual coil conductors or molded bars which hold them in position. Four symmetrically spaced mounting holes are provided to permit connections to be attached in line with the trap axis or 90 degrees to it.

3 Nameplates

Nameplates mounted directly on the end brackets give all necessary information on the trap and tuning units.

4 Trimmer Connector

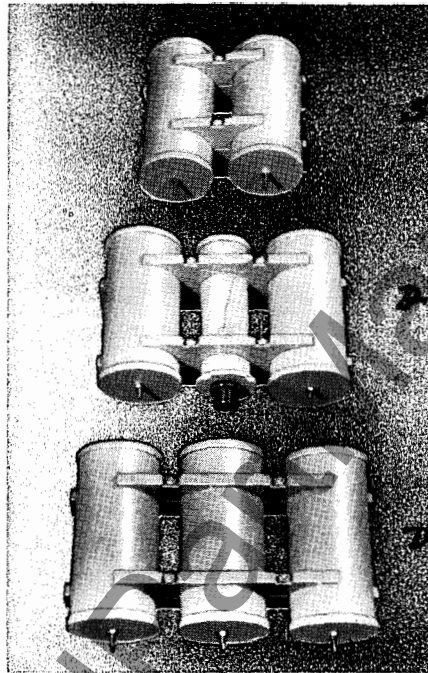
To simplify the task of fine tuning a trap after it has been mounted, a trimmer wire connector is included that:

1. Can be manipulated, positioned and tightened with one hand.
2. Maintains necessary contact pressure without solder or wire clamps.
3. Can be readjusted at any time.

Mounting

Simple mounting is accomplished by the use of the sturdy end brackets, which support the trap on pedestals. The pedestals can be rotated to accommodate bolt center lines of the supporting insulators. The terminal pads are sufficiently strong to serve also as lifting lugs while lowering the trap into mounting position. In suspension mounting, the cables may be attached directly to the end brackets. It is quite common to mount one pedestal of the line trap on top of the coupling capacitor. See DB 39-611 or 39-621, whichever type coupling capacitor is applicable.

Tuning Units



Typical S, D1 and D2 tuners.

Type of Tuners

Each single frequency line trap contains one "S" tuner. In addition to the "S" tuner, each double frequency line trap contains one "D-1" and one "D-2" tuner. Wide band line traps contain two ("W") tuners. In addition, each line trap also contains a lightning arrester. All are similar in appearance to those shown above.

Tuning packs are located inside the main line trap coil and at one end for easy access. Mounting boards bolted to each end frame are used for mounting the tuning packs. The mounting boards are drilled with slotted holes to simplify installation of the tuning packs. The hardware which holds the tuning packs to the mounting boards is captive to prevent it from accidentally being dropped into the main coil where it could cause damage. In addition to the tuning packs, the lightning arrester and, when specified, de-Qing resistors are located on the mounting boards.

All connection among tuning components and to the main coil are made with flexible copper leads. All connections other than the tuning clamp are made to tin plated silicon bronze studs.

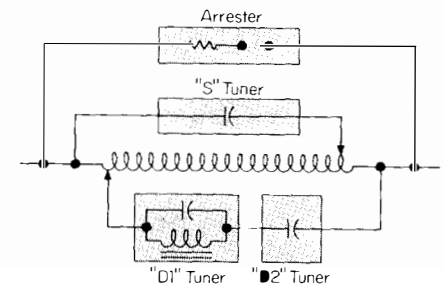
Construction

Tuning pack capacitors have a completely dry dielectric system. Capacitor sections are built up using electrical grade aluminum foil and a synthetic film. These sections are then stacked in series to obtain the correct capacitance and voltage withstand value, placed inside a spun fiberglass cylinder and potted. The combination of the fiberglass housing and potting compound protect the capacitor from shipping and handling damage as well as weathering. The adjustable inductor which is used in double frequency and wide band line traps is also potted and housed in a fiberglass cylinder.

Lightning Arrester

Protection against overvoltage is afforded by a hermetically sealed lightning arrester. This arrester uses a solder sealing system that is far superior to conventional gasket seals, which can age, compress, and permit entrance of moisture, resulting in eventual arrester failures.

The arrester is chosen, so that, it will not sparkover during rated short circuit current but will protect the tuning components against traveling waves on the line due to switching or lightning surges.



High "Q" double frequency line trap schematic, single frequency line traps use only the S tuner and lightning arrester. Low "Q" single frequency line traps have a resistor in series with the S tuner, low "Q" double frequency line traps have resistors in series with the S and D2 tuners.

Tuning

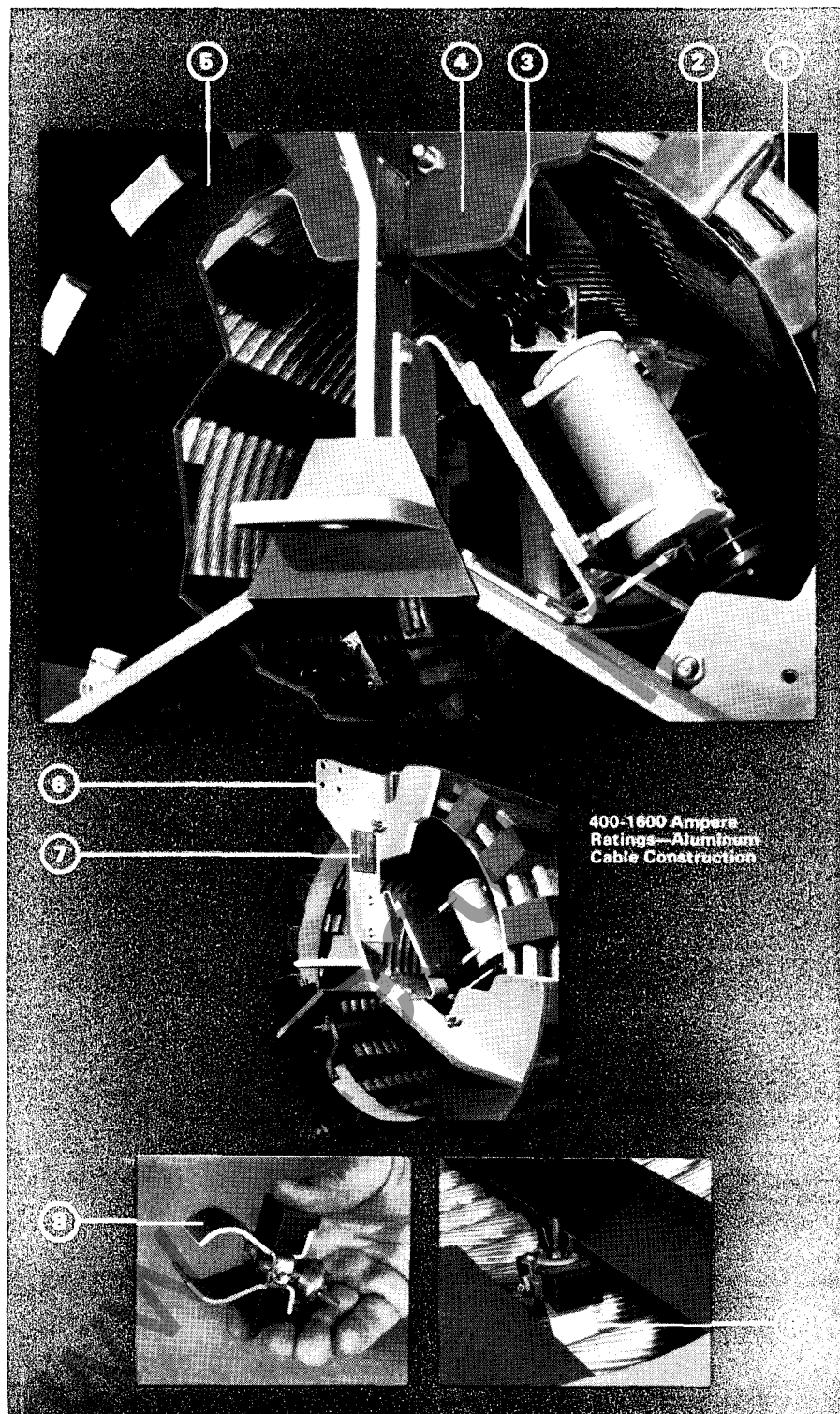
Tuning is easily accomplished by connecting the capacitor units in series or parallel combinations. Connections between tuning elements are made with flexible copper leads. Double frequency and wide band line traps also use an adjustable indicator which is adjusted with a screw driver after removing the protective cover. In addition, tuning clamps are used to connect the tuning packs to the main coil and to tap the coil to obtain the correct values of inductance.

Versatility results from using the same tuners for all line traps except the 30 - 90 KHz 800 ampere and the 400 ampere ratings.

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Design Features

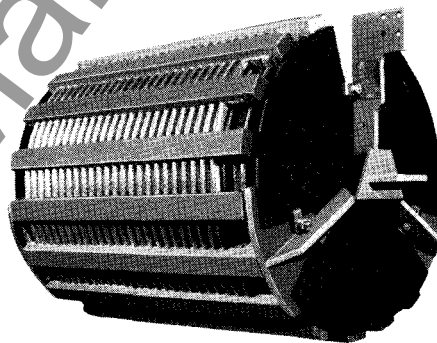


400-1600 Ampere
Ratings—Aluminum
Cable Construction

1 Power Current Coil

Sturdy construction, plus high strength and rigidity during conditions of flow of system fault current are features of the main, or power current, coil. 400 ampere line traps are wound with multiple layers of aluminum bar in parallel.

800 ampere and higher rated line traps are wound with parallel layers of stranded aluminum cable. Stranded cable is used for these line traps to reduce their eddy current losses.



2000 Ampere Rating—Aluminum Cable Construction (shown with bird guards)

2 Molded Design

The coil structure is supported by a liberal number of spacing bars which provide positive conductor separation. These spacing bars are molded from a special thermosetting polyester resin compound developed for this purpose. High dielectric strength, high mechanical strength, low dielectric loss, together with excellent weather resistance are the proven properties of this resin over long periods and for a running temperature range of -40°C to $+125^{\circ}\text{C}$. The mechanical strength is approximately five times that of concrete.

3 Strain Members

Strain members hold the end bracket in compression relative to the coil structure. Porcelain insulators are incorporated in the strain members of all line traps. These insulators will withstand all mechanical and electrical stress conditions associated with fault currents. The insulators also serve to isolate the end frames from each other. A completely assembled line trap has many times the strength necessary for service when either pedestal or suspension mounted.

4 End Brackets

The molded coil assembly is welded between two heavy gauge aluminum end brackets. These end brackets serve as:

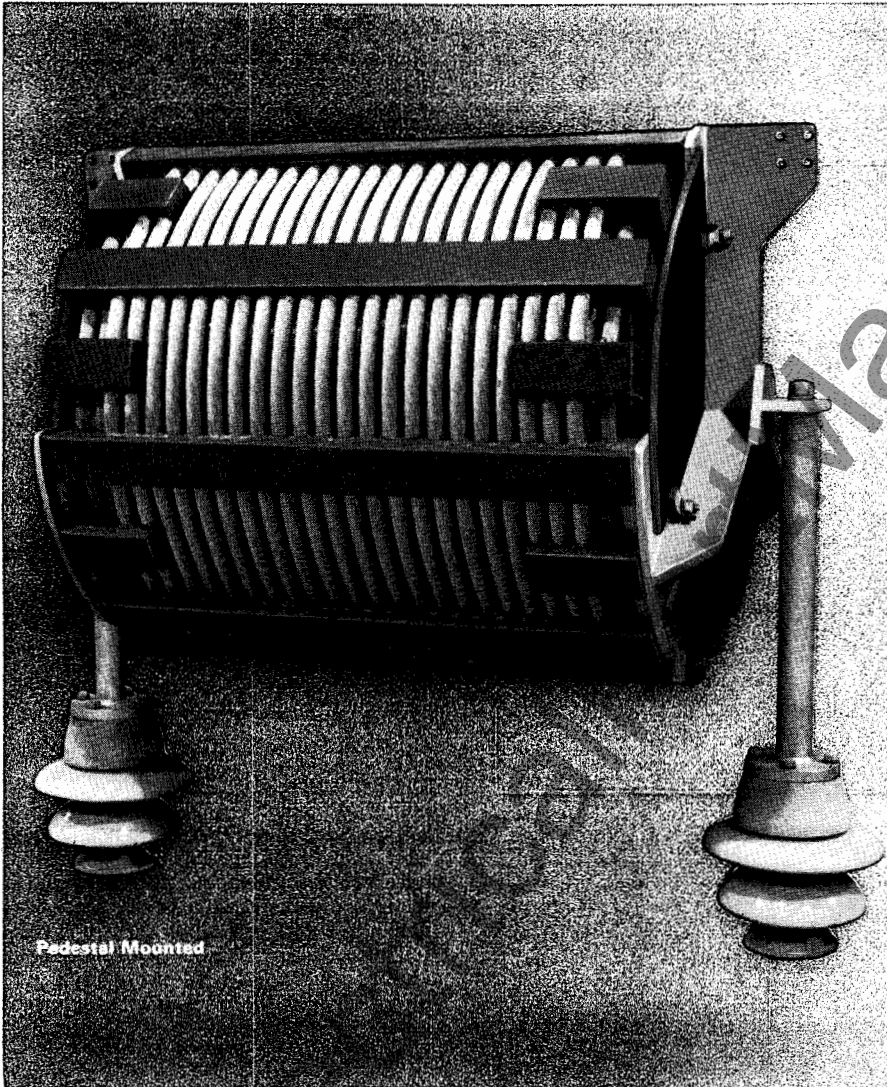
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Line Traps

Types MS, MD and MW

For Power Line Carrier Applications
400-3000 Amps
Single, Double and Wide Band Tuning
Pedestal or Suspension Mounting



Pedestal Mounted

Advantages

Maximum Strength: The molded bar construction with sturdy mounting assembly provides a trap capable of withstanding very high mechanical forces during faults. The bars serve to hold the coil absolutely rigid, preventing any sag over time, which could reduce the short-circuit withstand ability of the line traps. The multi-layer aluminum coil design reduces diameter and length to a minimum while maintaining optimum strength to weight ratio.

Liberal Inductance: The inductance chosen for all ratings provides excellent characteristics for all frequency ranges.

Adequate Frequency Range: They provide complete coverage of all frequencies in the generally accepted range of 30 to 300 KHz.

Simplified Tuning: Tuning unit and circuit arrangement provide easy tuning to any desired channel without removing the tuning units. No instruments are needed for most tuning requirements.

All Aluminum^①: The multi-layer coil is welded directly to the aluminum current-carrying end brackets, thereby eliminating contact resistance. Use of aluminum achieves reduced weight plus resistance to weathering.

^① Galvanized, non-magnetic steel end brackets are used for 2000 ampere traps.

Application

The Westinghouse type M line trap is a resonated inductance for use in power lines over which carrier channels have been established. They present a high impedance to the carrier frequency, or band of frequencies, while the impedance at power frequency is negligible.

They increase the effective range of carrier equipment by reducing the loss of carrier power in connected lines or networks not being used for carrier communication or relaying. The type M line trap will permit normal carrier operation when these lines or networks are grounded for 60 cycle power. Interference is reduced between carrier

channels, and the reliability of carrier channels is assured even under adverse conditions caused by short circuits, grounds or switching phenomena on connected lines.

The type MS trap can be tuned to block a single frequency of any value within its designated frequency range. The type MD trap can be tuned to block two frequencies within its range, provided they are separated by at least 25 kc, or 25% of the higher frequency, whichever is greater.

The type MW trap is factory tuned to block all frequencies in the "wide band" range (90 to 200 kc) with a minimum impedance of 400 ohms over this entire band width.