Publication: 203030

Issue Date: June 1990

TECHNICAL MANUAL

Dipole Antenna Coupler

DAC Series

Models in Series:

DAC-1, DAC-2, DAC-4, DAC-5, DAC-6,DAC-9

DAC-10, DAC-11, DAC-13 and DAC-14

THE TECHNICAL MATERIEL CORPORATION

COMMUNICATIONS ENGINEERS

What does TMC do?

The Company

The Technical Materiel Corporation (TMC) is engaged in the business of communications engineering. Simply stated, we make it possible for people and machines to communicate with one another by planning, creating and combining equipment to provide complete facilities for modern communications. We accomplish this with people, working at various TMC locations worldwide.

Our line of over 400 products range from the basic assemblies used in RF transmission to the complex systems used in computer command and control. Designed to carry data, facsimile, video and voice throughout the world, these products include -

Communication Systems
Transceivers
Transmitters
Receivers
RF Antenna Couplers
Security Equipment
Remote Control Systems
Computer Hardware/Software
RF/Digital Connectors
Patch Panels
Audio/FSK Products
Tools and Test Equipment

Since 1947, when TMC was first organized as a supplier of electronic equipment to the U.S. Armed Forces, the focus of the company has been on providing customers throughout the world with the type of equipment they need to communicate. Our customers include commercial users, both U.S. and foreign governments, and civil defense agencies. Today, TMC equipment is found in 140 countries on five continents. It is so reliable that we still support operating equipment built in TMC plants over 30 years ago.

Engineering

TMC invests in the future of its customers by constantly upgrading its product line with new materials and techniques. Our engineering staff has a dual purpose: support the customer in the field and develop new products to meet that customer's changing needs. This ongoing effort has created a loyal following among professionals worldwide as well as an extensive product line backed by broad technical expertise in modern communications.

The technical products engineered by TMC satisfy real customer needs. They are designed for use by practical engineers and technicians operating large communications installations. These products and services provide customers with the greatest possible value. As a result, TMC has gained a solid reputation as a supplier of practical communications products that operate reliably at low cost over long periods of time.

Quality

Only the finest workmanship goes into the design and manufacture of TMC products. There is no compromise here. Our equipment is designed to last for many years. We build in to the assembly process many tests that detect flaws in the product. Before any product leaves the factory, all flaws are corrected - otherwise, the product never gets into the field. Our success in achieving zero-defect quality is measured by the long list of customers who have repeatedly come back to TMC over the decades. It is this respect and loyalty that assures our customers are always offered the best in modern equipment designs for their communications needs.

Customer Support

Our sale never ends with delivery of equipment to a customer. We maintain a staff of electronic and mechanical engineers, all with many years of experience, who travel to outlying sites to maintain and install our equipment. They also train technicians "on the job" in correct procedures so that equipment is assured a long, trouble-free life.

Closer to home, the engineering services TMC offers cover the full spectrum of support for the complex and varied products operating in the field. These services include -

System Engineering
Software Development
Service and Installation
Assembly and Test
Packaging
Program Management
Publications
Site Preparation and Design
Spare Parts Support
System Integration
Network Design
Training

Customer support, however, goes beyond these services. There are the people at TMC - a telephone call away from answering any question - technical or otherwise. There is the TMCommunicator newsletter which keeps users of TMC products advised of the latest developments in modern equipment design. There is the computer call-in service which allows users to enter inquiries directly into an on-line computer database for a 24-hour response. There are the product bulletins, the technical manuals, the application notes, the field service notes - all the support you need to do an effective job with TMC products.

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DAC Series

Models in Series:

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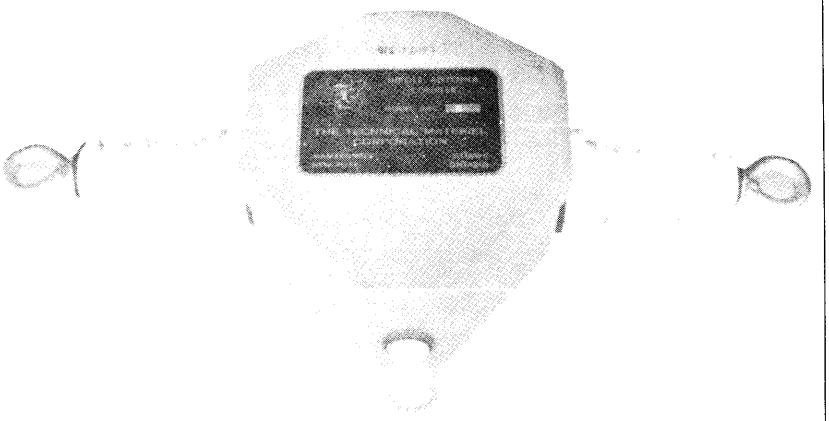
DAC-10, DAC-11, DAC-13 and DAC-14

The Technical Materiel Corporation
700 Fenimore Road
Mamaroneck, New York 10543-0142 U.S.A.

Dipole Antenna Coupler
Model DAC

TECHNICAL BULLETIN 204-4413

2-32 MHz
Built-in Lightning Protection
Weather resistant
Sealed fiberglass case
Stainless steel connector rings
2,000 pound tensile strength



The designation "DAC" used throughout this manual refers to all models in the series. Exceptions are noted in the text.

The Model DAC Antenna Coupler is an impedance matching device that provides a balanced connection for the center of a receiving dipole to a 50 or 70 ohm unbalanced coaxial transmission line. The transformer used in the DAC provides a flat response over a wide frequency range. However, because dipole antennas are constructed for finite frequencies, the impedance match from the antenna to the coaxial transmission line is dependent on the frequency for which the dipole is cut. The DAC couplers are suitable for single or fan dipole antenna systems.

Stainless steel connector rings are provided for the antenna connector and for messenger tie points. The entire unit is contained within a sealed fiberglass reinforced plastic case, and additional strength and weather resistance is provided by potting the transformer and connectors in a plastic compound. A built-in lightning arrestor prevents the accumulation of static charges which might otherwise injure associated equipment.

A tensile test of a sample DAC was conducted by a leading research laboratory to determine the amount of applied tensile stress needed to damage the sample. The sample successfully passed a tensile strain of 2,000 pounds between each of the antenna eye-bolts.

TECHNICAL SPECIFICATIONS

Transformer Frequency Response
Flat within +/-1.5 db throughout the frequency range of the model.

Equipment Case
Reinforced fiberglass plastic.

Input Terminals
Standard Ring-Type.

Impedance Match
Refer to CHART "A" below.

Size and Weight
12½" wide x 7¾" wide x 2¼" deep maximum including terminals.

Mounting
Pole mounting plate or connector rings.

CHART "A" **MODELS AVAILABLE**

Model	Balanced Input	Unbalanced Output	Frequency Range	Connector	TR·
DAC-1	70 ohms nom.	70 ohms nom.	2-32 MHz	N	030
DAC-2	300 ohms	70 ohm	2-32 MHz	N	119
DAC-4	200 ohms	70 ohms	2-32 MHz	BNC	068
DAC-5	70 ohms	70 ohms	2-32 MHz	UHF	030
DAC-6	70 ohms	50 ohms	2-30 MHz	N	120
*DAC-8	70 ohms	50 ohms	2-30 MHz	N	120
DAC-9	475 ohms	50 ohms	2-30 MHz	N	010
DAC-10				N	None
*DAC-13	200 ohms	50 ohms	2-30 MHz	N	039
DAC-14	200 ohms	50 ohms	2-30 MHz	UHF	091

**with pole mounting plate and hardware in place of connector rings.*

Technical Specifications Are Subject to Change Without Notice

THE TECHNICAL MATERIEL CORPORATION
700 FENIMORE ROAD, MAMARONECK, NEW YORK 10543 U.S.A.
TEL.: 914-698-4800 CABLE: TEPEI TLX: 137-358

Section 1 - General Description

1.1 Functional Description

1.1.1 Overview

The DAC HF Dipole Antenna Coupler is a broadband transformer coupling unit used for matching coaxial transmission lines to balanced dipole/doublet, long-wire or other similar antenna system. Use of the DAC at any facility will allow uniform coaxial transmission and coaxial antenna transfer by providing the proper impedance match at the antenna. The DAC provides an efficient means of coupling to match a variety of RF impedances over the frequency range of 2 to 30MHz. It provides a frequency response that is flat within 1.5dB over this range.

1.1.2 Major Assemblies

The DAC coupler consists of one broadband transformer housed in a re-inforced case for operation in any ambient environment from -50°C to +75°C. Brackets are provided for wire, pole or wall mounting. Since no maintenance is required, the coupler may be placed in any isolated area, such as a remote antenna farm. Outline and mounting dimensions of the DAC are shown in Figure 2.2.

1.1.3 Input/Output Characteristics

Several impedance transformation values are available depending on the model selected. These include 70/70, 300/70, 200/70, 70/50, 475/50, 200/50 and 600/70-ohm. The models are differentiated by number. Models listed in Section 1.4 reflect the type of unbalanced connector assembly used.

1.2 Physical Description

1.2.1 Equipment Mounting

The DAC is designed for wire, pole or wall mounting. The necessary hardware is provided. A universal plate is provided for pole or wall mounting by simply removing the cable clamps along the top of the plate and using bolts through the holes.

1.2.2 Balanced RF Connections

The balanced connectors consist of two horizontally-opposed insulators mounted through the sides of the coupler case. Standard threaded rods with stainless steel nuts and flat washers are used to secure the antenna feed lines.

1.2.3 Unbalanced RF Connections

Several unbalanced connectors are available for the DAC units and are mounted at the bottom of the DAC case. Different choices are available depending on the antenna installation. Refer to Section 1.4 or the TMC Connector Products Catalog for other connector assemblies.

1.3 Technical Specifications

Frequency Range 2 - 30 MHz
Frequency Response Flat within 1.5dB over operating range
RF Power Rating (DAC-10) 500W Average
Impedance Matching Capability Based on model selected (See chart)
RF Fittings - Unbalanced Coaxial Based on model selected (See chart)
RF Fittings - Balanced Terminals Twin ceramic insulators on 12-inch centers.
Mean-Time-Between-Failure In excess of 100,000 hours.

Operating Features

Cooling Convection, no fans or moving parts
Ambient Conditions -50°C to +50°C; Up to 100% R.H. Storage -50°C to +80°C
Primary Power Passive device. No external power is required.
Size and Weight (Including fittings) 12W x 2.5D x 6H inches, 2lbs
Mounting plate: 7W x 8H x 0.8D, 2.5lbs. Shipping cube/weight 0.5 cu.ft./5 lbs.

Special Features

Components and Construction Totally solid state transformer assembly, mounted internally to a re-inforced fiberglass case that is sealed for protection against the environment. External hardware is stainless steel.

1.4 DAC Product Group

DAC-1	**Dipole Antenna Coupler, 70B/70U, N-Type***
DAC-2	**Dipole Antenna Coupler, 300B/70U, N-Type**
DAC-4	**Dipole Antenna Coupler, 200B/70U, BNC-Type**
DAC-5	**Dipole Antenna Coupler, 70B/70U, UHF-Type**
DAC-6	**Dipole Antenna Coupler, 70B/50U, N-Type**
DAC-9	**Dipole Antenna Coupler, 475B/50U, N-Type**
DAC-10	**Dipole Transmitting Antenna Coupler, N-Type**
DAC-11	**End-Fed/Long-Wire Antenna Coupler, N-Type**
DAC-13	**Dipole Antenna Coupler, 200B/50U, N-Type**
DAC-14	**Dipole Antenna Coupler, 200B/50U, UHF-Type**

***Note: "B" refers to balanced rating; "U" to unbalanced rating.**
"x-Type" refers to the type of unbalanced connector assembly.

Section 2 - Installation

2.1 Initial Inspection

2.1.1 General

The DAC is shipped in one container and is completely assembled at the time of delivery from the factory. Every DAC undergoes a thorough testing prior to shipment. Upon receipt of the unit, check the packing case and its contents for obvious damage. Unpack the equipment carefully to reduce the risk of damage and to avoid misplacing any parts shipped as loose items. Normally, loose items are not provided unless the installation requires unique hardware.

2.1.2 Damage By Carrier

With respect to equipment damage for which the carrier is liable, TMC will assist in describing methods of repair as well as furnishing replacement parts.

2.2 Electrical Installation

2.2.1 General

Each unit has been factory tested and arrives ready for immediate installation and operation. No preliminary adjustments are necessary.

2.2.2 Mounting

The DAC is designed primarily for wire mounting. The coupler is mounted to a single plate with three, stainless steel bolts anchored internally to the re-inforced fiberglass case. Three in-line cable clamps are mounted on this plate across the top section. A single support wire can be passed through each clamp to provide an extra measure of strength for the antenna. Figure 2.2 illustrates the necessary outline and mounting dimensions of the DAC. Figure 2.1 is a schematic illustration of a typical dipole antenna system using the DAC Series.

2.2.3 External Antenna Connections

The two antenna input leads are connected to the two insulator terminals of the DAC. These insulatorss are located opposite each other on the sides of the case.

2.2.4 External Coaxial Connections

The coaxial lead-in cable is connected to the DAC RF connector assembly located on the bottom of the case.

2.3 Performance Check

2.3.1 General

When the appropriate RF connections to the antenna and the coaxial lead-in cable have been made, the DAC is ready for use. No further steps are required.

Section 3 - Operation

3.1 General

After connecting the antenna leads and coaxial lead-in cable, as described In **Section 2 - Installation,** no further operating procedures are required. The DAC is now fully operational without further adjustment.

Section 4 - Maintenance

4.1 General

Due to the simplicity of construction and design of the DAC, maintenance may simply consist of looking for secure connections and unit cleanliness.

4.2 Preventive Maintenance

4.2.1 General Cleaning Methods

Preventive maintenance for the DAC consists of routine functions such as visual inspection and cleaning. Periodic cleaning is recommended as dust may build up on components, reducing the efficiency of the coupler unit and possibly causing circuit failure. To facilitate cleaning the unit, use a vacuum cleaner or a low-pressure filtered compressed-air supply.

4.2.2 Visual Check

A simple visual check of the unit when it is opened up for servicing or cleaning will often reveal potential trouble spots and thereby reduce downtime due to component failure. Signs of trouble may be found in discoloration, damaged wiring or frayed cables. Any deteriorating component should be replaced. All hardware should be checked for tightness during preventive maintenance inspections.

4.3 Troubleshooting

During operation of the DAC, the following failure symption may be observed:

- No signal output or weak signal to the antenna system.

Possible Cause:	Receiver/transmitter failure (Output affected)
Remedial Action:	Refer to equipment manual
Possible Cause:	Interconnection, coupler to transmitter
Remedial Action:	Check the RF coaxial cable between the equipment and coupler.
Possible Cause:	Interconnection, coupler to antenna
Remedial Action:	Check the twin RF leads between the coupler and the antenna.
Possible Cause:	Antenna fault
Remedial Action:	Check for a fault in the antenna system. Make certain all of the RF connections are securely fastened.

4.4 Repair

Repair work generally consists of replacing the defective component. The following cautions should be observed:

- Make sure the replacement component is an exact duplicate of the defective one.
- Place any new component in the same location as the component it replaces.

The DAC is unique in that only one electrical assembly is used. Other than external components such as the hardware, repair is rarely needed. In the event the internal transformer fails - a direct lightning hit would do it - the entire assembly is replaced. Factory repair of the DAC is available directly from TMC.

Section 5 - Parts Lists

Table 5.1Replacement Spare Parts List

TMC Part Number	Description	Quantity	Used On
GA115	Gasket, flange, neoprene	2 each	NS107
GA137-1	Gasket, flange, neoprene	2 each	NS107
GA149-5	Gland, neoprene	1 each	*
UG58/U	Connector, N-Type	1 each	*
NS107	Insulator, standoff	2 each	All DACs
TR030	Transformer, broadband RF	1 each	DAC-1,5
TR119	Transformer, broadband RF	1 each	DAC-2
TR068	Transformer, broadband RF	1 each	DAC-4
TR120	Transformer, broadband RF	1 each	DAC-6
TR010	Transformer, broadband RF	1 each	DAC-9
TR039	Transformer, broadband RF	1 each	DAC-13
TR091	Transformer, broadband RF	1 each	DAC-14

* Used only on DAC-1, DAC-2, DAC-6, DAC-9, DAC-10, DAC-11, DAC-13, DAC-14.

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Some of our Customers . . .

Communications equipment manufactured by TMC has been purchased for use in a large number of organizations and countries throughout the free world. In addition, TMC is a large-volume producer of communications equipment for the worldwide commercial, government and defense markets. Active sites using TMC products are depicted on the world locator map. A partial list of customers indicates how widely accepted TMC products and services have become.

Government and PTT Organizations

Greece, Italy, Switzerland, Spain, Portugal, Turkey, Kenya, Morocco, Liberia, Saudi Arabia, Pakistan, Korea, Indonesia, Canada, United States, Australia, Papua New Guinea, New Zealand, Nepal, Singapore, Thailand

Civil Aviation Agencies

Belgium, France, Spain, Greece, Chile, Brazil, Turkey, Italy, Pakistan, Algeria, Saudi Arabia, Liberia, Kenya, Zambia, Canada, United States, Phillipines

The United Nations

NATO Procurement Agencies (Europe)

International Corporations

American Telephone & Telegraph (ATT), International Telephone & Telegraph (ITT), General Telephone & Electronics (GTE), Contel-Page Communications, Marconi, Racal, Rockwell International/Collins, Harris/RF Communications, General Electric/RCA, Raytheon Service, Bell Canada, Arabian-American Oil (Aramco), Air Canada, Pan American Airways, Continental Electronics, Thomson CSF, General Dynamics, Lockheed Aircraft, Sandia, Western Electric

Military and Defense Forces

Norway, Denmark, West Germany, Belgium, France, Italy, Spain, Portugal, Greece, Turkey, United Kingdom, Algeria, Saudi Arabia, Nigeria, Kenya, Pakistan, United States, Canada, Thailand, New Zealand, Australia, India

Complete Families of TMC Products

COMMUNICATIONS EQUIPMENT				
Systems	SYM			Transportable/Contingency Communications
Transmitters	GPT	HFT		High Frequency Sideband Transmitters
	LFT	MFT	BCT	Broadcast, LF and MF Transmitters
Exciters	MMX	LFE	SBG	Multi-mode LF/MF/HF Synthesized Exciters
	STE	SME		Multi-mode Multi-Channel Exciters
Receivers	GPR	STR	SMR	Synthesized and Multi-Channel Receivers
Transceivers	TTR			High Frequency Synthesized Transceivers
COMPUTER PRODUCTS				
Remote Control	TCR	TCS	RMC	Remote Monitor and Control Systems
Security Systems	SCS			Security Monitor and Control Systems
Software	TMC			Network Monitor and Control Software
ANTENNA PRODUCTS				
Antennas	ARA	VRA	VTA	Vertical Receiving/Transmitting Antennas
	DPA	RBA	SVA	Dipole, Rhombic, Sloping-V Antenna Systems
	VDA	VOA		Directional/Omnidirectional VHF Antennas
Tuners	ATS	ATU	MAT	Antenna Tuners and Tuning Systems
Couplers	RAC	TRC	DAC	Receiving/Transmitting Antenna Couplers
Multicouplers	AMC	LMC	VMC	Receiving Antenna Multicouplers
Filters	LPF	RFP	TFP	Low Pass, Harmonic and Receiving Filters
CONNECTOR PRODUCTS				
Patch Panels	SPP	QDP	JPP	Switching/Quick-Disconnect Patch Panels
RF C nn ctors	CA	AX	TCA	RF Cables and Connector Assemblies
	PL	ES	SW	Plugs, Switches, End Seal Assemblies

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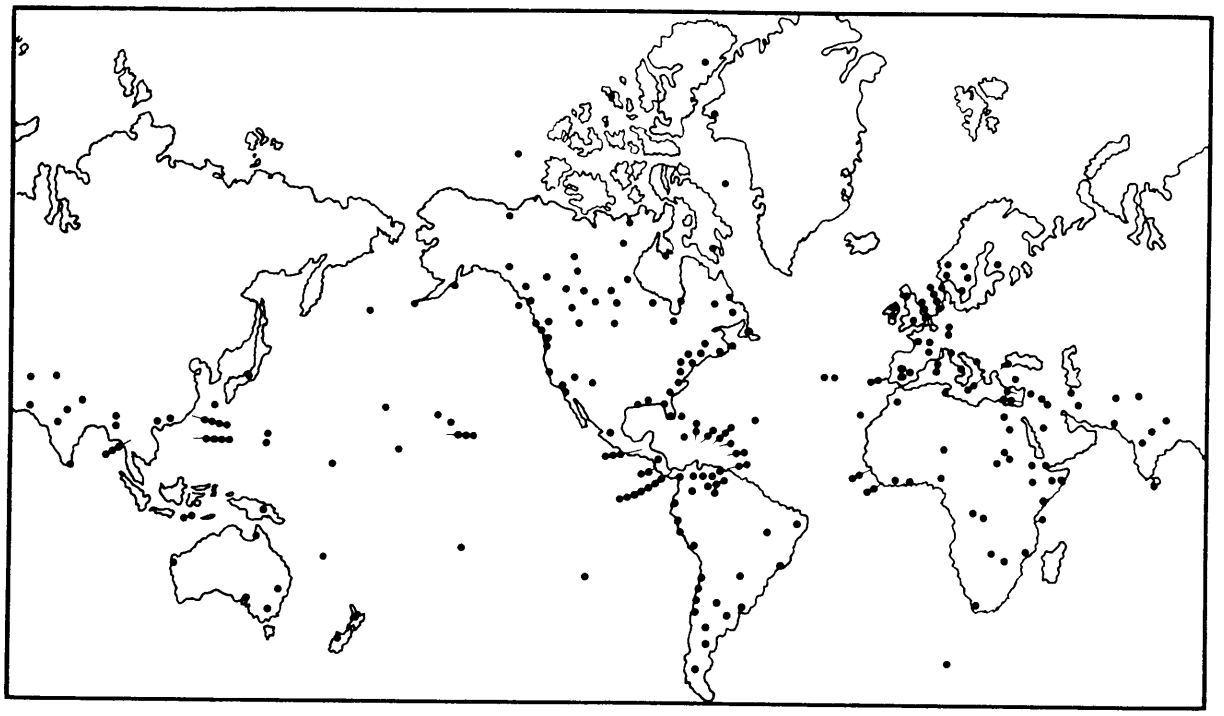

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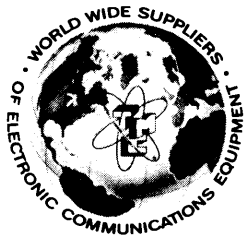

Customer Service: 914-698-4800/Telex 137358

PLEASE READ THIS FIRST

Dear **TMC** product user:

Thank you for purchasing the TMC DAC Series of Dipole Antenna Coupler. This series consists of ten different models that provide impedance matching of receivers or transmitters to dipole/doublet or long-wire antenna systems. The complete series operate in the 2 to 30MHz frequency range. The Model DAC-10 operates at a power rating of 500 watts average.

The antenna coupler is described in detail in the enclosed technical manual. This publication provides important information about using TMC equipment. Please read it.

Since the DAC requires mating connectors and coaxial cables to operate properly, a catalog on TMC's connector products is included. If you need additional data or some specific technical information, please give our Customer Service a call at (914) 698-4800 or return the business reply form provided in this package. Our FAX (fac-similie) number is (914) 698-4805.

If you are missing any items, please contact TMC directly or through your local TMC sales office. In Canada, please call 613-727-0460

Thank you for selecting the DAC Series of antenna couplers.

The Technical Materiel Corporation
Product Marketing

Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment - except electron tubes, semi-conductor devices, fuses, lamps, batteries, and articles made of glass or other fragile or expendable materials - purchased hereunder to be free from defect in workmanship and materials under normal use and service, when used for the purposes for which the same is designed, for a period of ONE YEAR from the date of delivery FOB factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, FOB factory, which may fail within the stated warranty period, provided:

- Any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction;
- The defect is not the result of damage incurred in shipment from or to the factory;
- The equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise; and
- Any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

At TMC's option, any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid and the TMC RETURN AUTHORIZATION number clearly marked on the package. Electron tube warranty claims should be made directly to the manufacturer of such tubes since tubes furnished by TMC bear only the manufacturer's warranty.

No warranties, expressed or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the purchaser's sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of such equipment, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

All inquiries should be directed to the following:

THE TECHNICAL MATERIEL CORPORATION

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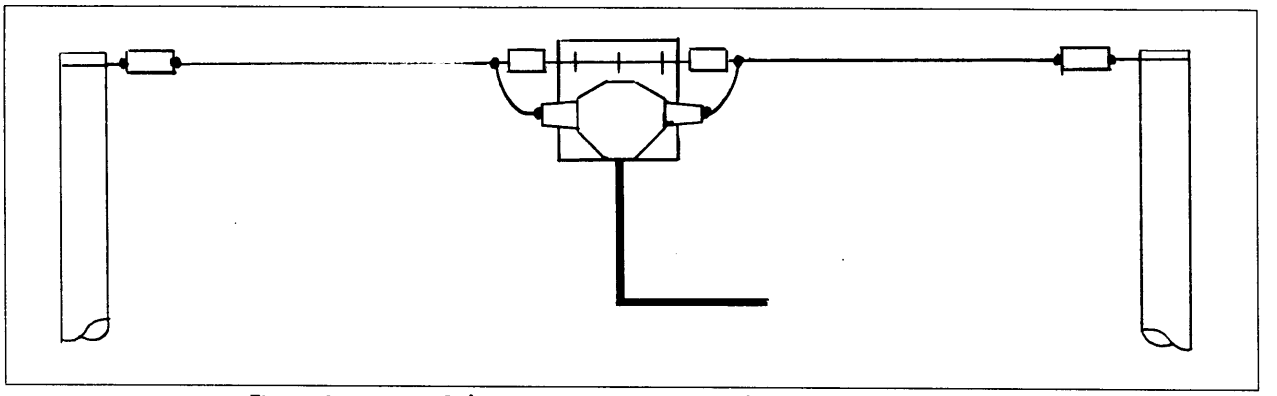

Figure 2.1 *Schematic Diagram, Typical Dipole Antenna System*

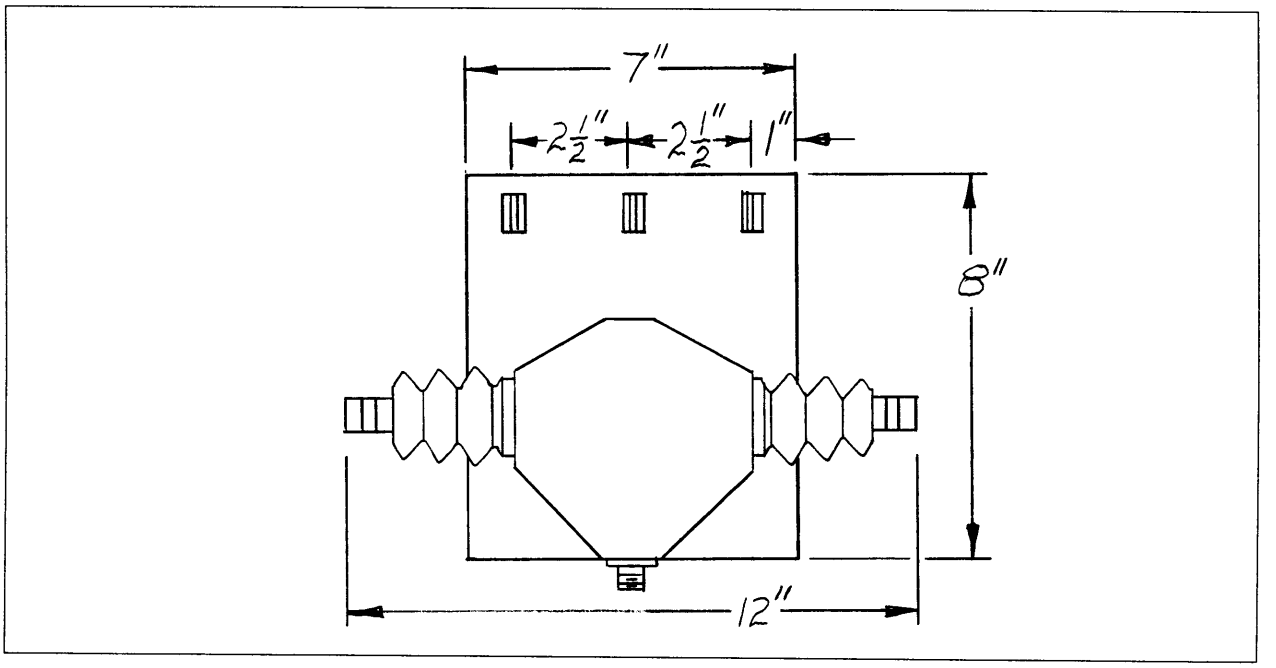

Figure 2.2 *Outline Drawing with Mounting Dimensions*