Publication: 210308C

Issue Date: February 1994

TECHNICAL MANUAL

for

HF/MF Receiving Antenna Multicoupler

Model AMC-21

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:

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- 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.

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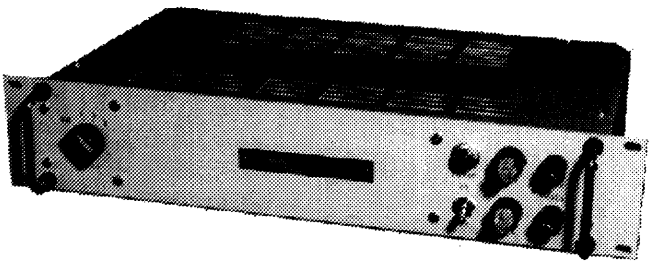
RECORD OF REVISIONS

Table of Contents

List of Illustrations

List of Tables

Receiving Antenna Multicoupl r, Model AMC-21



Model AMC-21-4	Four RF Outputs/One RF Input
Model AMC-21-8	Eight RF Outputs/One RF Input
Model AMC-21-12	Twelve RF Outputs/One RF Input
Model AMC-21-16	Sixteen RF Outputs/One RF Input

Input Filter Selection	By front-panel rotary switch.
	Filters are mounted internally to chassis

Section 1 - General Description

1.1 Functional Description

1.1.1 Overview

The AMC-21 MF/HF Antenna Multicoupler is a broadband coupling unit, used for coupling up to sixteen medium/high frequency communication receivers to one common antenna, simultaneously. In addition, the multicoupler may be used as an RF distribution unit when multiple signals from one source are required for test or analysis.The multicoupler provides a nominal 2dB gain from the antenna to any receiver, with a wide dynamic range and low noise characteristic over the frequency range of 100kHz to 40MHz. The equipment is designed to provide excellent isolation from receiver to receiver and from each receiver to the antenna. The multicoupler is fully solid state, including power supply components.

1.1.2 Major Assemblies

The multicoupler consists of one input preamplifier; a variable number of output buffer amplifiers; optional RF input filters; and a regulated power supply. The input preamplifier is connected to the output amplifiers through an RF distribution line.

1.1.3 Input/Output Characteristics

The input and output characteristic impedance is 50 ohms, with a VSWR better than 1.2-to-1. Optionally, 70 ohms impedance can be provided. Isolation is maintained to a minimum of -40dB between each receiver terminal and -55dB from each receiver terminal to the antenna input. One of three optional input filters may be switched in depending on the prevailing operating conditions at the receiving site.

1.1.4 RF Outputs

The number of output ports available with the AMC-21 is variable in multiples of four. Up to 16 MF/HF outputs can be provided from a common antenna. Input/output connectors, other than the BNC-type normally installed, may be accomodated with adapters depending on the interconnect required at the receiving site.

1.2 Physical Description

1.2.1 Equipment Mounting

The AMC-21 is designed for mounting in a standard 19-inch rack. The operating controls are located on the front panel. The input connector, output connectors and primary power socket are mounted on the rear panel. The amplifiers and power supply regulator are mounted on printed circuit boards which are in turn bolted to the coupler chassis.

1.2.2 Semiconductor Complement

A list of a semiconductors used in the AMC-21 are listed in Table 1.1.

Table 1.1 - Semiconductor and Integrated Circuit Complement

Power Supply and Regulator

Rectifier Bridge	NW10005
Bias Regulator	1N758A
Bias Regulator	1N914B
Current Regulator	TX10001
Voltage Regulator	2N5086
Voltage Regulator	2N3055

Preamplifier and Output Circuits

Bias Regulator	1N914B
Buffer/Emitter-Follower	2N3866
Current Amplifier	2N5160

1.3 Technical Specifications

Frequency Range 100kHz-40MHz no filter; 2-32MHz with bandpass filter; 2-40MHz with high pass filter; other filters including broadcast stopband filter are available.

Number of Outputs 4, 8, 12 or 16 MF/HF output ports with frequency range determined by input filters installed.

Input/Output Impedance Nominal 50 ohms, unbalanced. 70 ohms is available. BNC-type connectors.

Insertion Gain Nominal +2dB over operating range.

Frequency Response +/-1.0dB, 100kHz-32MHz

Offband Rejection Greater than -60dB, 10-100kHz, depending on filter. Greater than -30dB, 46-1000MHz.

Noise Figure Less than +7dB, nominally +5dB.

Output/Output Isolation Greater than -40dB

Output/Input Isolation Greater than -55dB

Phase Differential +/-2 degree maximum, output-output

Desensitization For a 4-volt peak input, 10% removed from the operating frequency, a 100 microvolt received signal drops less than 3dB.

1.3 Technical Specifications (Continued)

Intermodulation Distortion For 50-ohm units: Second order is greater than -60dB for a 0.4-volt input; Third order is greater than -65dB.

VSWR Output is better than 1.2-to-1; Input is better than 1.8-to-1.

Mean-Time-Between-Failure Nominally 20,000 hours (AMC-21-4) per RADC reliability tables.

Operating Features

Cooling Convection, no fans or moving parts

Ambient Conditions 0°C to +50°C; Up to 95% R.H. Storage -30°C to +80°C

Primary Power 115VAC standard/230VAC optional, 48-400Hz, single phase.

Power Consumption 25 watts maximum.

Size and Weight 3.5H x 19W x 10.25D inches, 8lbs/3.64Kg (AMC-21-4)

Line Filters Greater than 40dB attenuation, 14kHz-150MHz.

Special Features

Monitoring Indicating fuseholders display status of primary power circuits

Safety Fuse and front-end overload protection, preventing circuit failure from high RF voltages at the input. High voltage points are covered and labelled.

Components and Construction Totally solid state circuits mounted to an aluminum alloy chassis. External hardware is stainless steel. Track slides are optional and due to weight distribution, are usually not required.

Switch-Selectable Input Filters One of up to three RF input filters may be selected by a front panel, four-position rotary switch. The first position removes any filtering of the input signal. The types of filters available are 1) broadcast band stop filter; 2) bandpass filter; 3) low pass filter; and 4) high pass filter. All filters are passive devices.

1.4 AMC Product Group

AMC-2X4 **Dual-Input HF Receiving Antenna Multicoupler, 2X4 Outputs**
AMC-2X8 **Dual-Input HF Receiving Antenna Multicoupler, 2X8 Outputs**
AMC-2X16 **Dual-Input HF Receiving Antenna Multicoupler, 2X16 Outputs**

AMC-8 **HF Receiving Antenna Multicoupler, Eight Outputs**
AMC-16 **HF Receiving Antenna Multicoupler, 16 Outputs**
AMC-32 **HF Receiving Antenna Multicoupler, 32 Outputs**

AMC-21-4 **MF/HF Receiving Antenna Multicoupler, Four Outputs**
AMC-21-8 **MF/HF Receiving Antenna Multicoupler, Eight Outputs**
AMC-21-12 **MF/HF Receiving Antenna Multicoupler, 12 Outputs**
AMC-21-16 **MF/HF Receiving Antenna Multicoupler, 16 Outputs**

50-Ohm Series Options:

- 5F0 50-ohm operation, no input filter
- 5F2 50-ohm operation, low-pass input filter (f_c=2.0MHz)
- 5F3 50-ohm operation, high pass input filter (f_c=2.0MHz)
- 5F4 50-ohm operation, broadcast stopband filter (0.6-1.9MHz)
- 5F5** 50-ohm operation, bandpass filter (2-32MHz)
- 5F23* 50-ohm operation - Includes Options 5F2 & 5F3 (switched)
- 5F24* 50-ohm operation - Includes Options 5F2 & 5F4 (switched)
- 5F34* 50-ohm operation - Includes Options 5F3 & 5F4 (switched)
- 5F234* 50-ohm operation - Includes Options 5F2, 5F3 & 5F4 (switched)

70-Ohm Series Options:

- 7F0 70-ohm operation, no input filter
- 7F2 70-ohm operation, low-pass input filter (f_c=2.0MHz)
- 7F3 70-ohm operation, high-pass filter (f_c=2.0MHz)
- 7F4 70-ohm operation, broadcast stopband filter (0.6-1.9MHz)
- 7F5** 70-ohm operation, bandpass filter (2-32MHz)
- 7F23* 70-ohm operation - Includes Options 7F2 & 7F3 (switched)
- 7F24* 70-ohm operation - Includes Options 7F2 & 7F4 (switched)
- 7F34* 70-ohm operation - Includes Options 7F3 & 7F4 (switched)
- 7F234* 70-ohm operation - Includes Options 7F2, 7F3 & 7F4 (switched)

* Available in Model AMC-21 series only.
** Not available in Model AMC-21 series.

When ordering, specify both model and option. Example: AMC-21-4/5F5. Input filters may be combined in AMC-2X and AMC-21 series only. Other filters are available.

2.1 Initial Inspection

2.1.1 General

Every AMC-21 undergoes a thorough testing and calibration 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. See Table 2.1 for a list of the loose items.

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 Output Module Installation

2.2.1 General

The design of the AMC-21 is such that additional output capability may be added in the field with ease. This is accomplished with dual-output, plug-in modules that fit into slots located along the center line of the rear panel. The module can be inserted upside-down so care must be taken when installing or the multicoupler will not operate properly.

2.2.2 Preparing for Installation

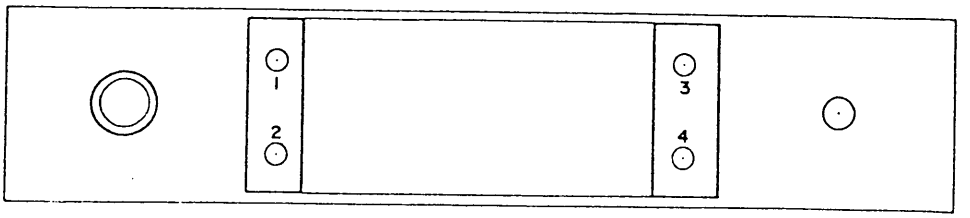
Remove power from the AMC-21 multicoupler by disconnecting the primary power cable. This step is necessary to protect components and reduce hazard to personnel working on the equipment. Turn the multicoupler around so that the rear panel is facing forward with the primary power cord to the left

2.2.3 Accessing the Output Module Basket

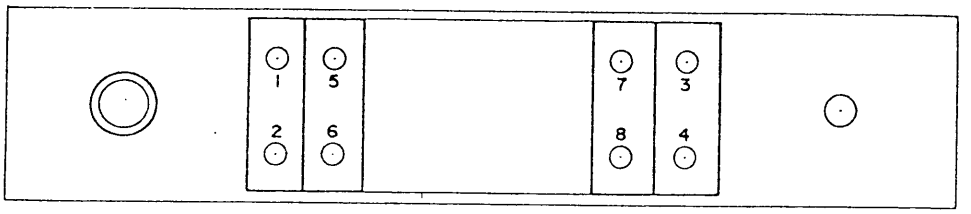
Refering to Figure 2.1, the output module is inserted at the rear panel of the AMC-21. Two machine screws hold a protective plate in place and must be removed to expose the printed circuit card basket. Working in from opposite ends of the basket as shown in the figure, select the next available slot for the output module. It is best to insert two output modules (four outputs) at a time since this maintains electrical balance in the preamplifier circuits.

2.2.4 Orienting and Inserting the Module

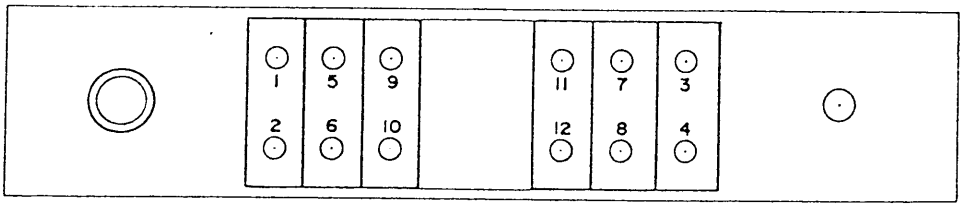
After the protective plate is removed, hold the output module with the flat side of the mounting bracket to the left; the components will be on the right. Insert the module in its slot by sliding the printed circuit card edges into the two tracks mounted on the basket. Use a firm pressure to seat the output module in the printed ciruit card connector mounted internally to the basket. The lips of the output module will stop against the rear panel when the module is seated properly. Replace the two machine screws to anchor the output module in the basket.



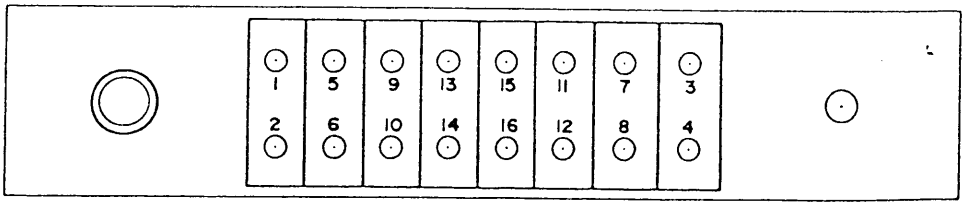
OUTPUT MODULE LOCATIONS WITH 4 CHANNEL OPERATION



OUTPUT MODULE LOCATIONS WITH 8 CHANNEL OPERATION



OUTPUT MODULE LOCATIONS WITH 12 CHANNEL OPERATION



OUTPUT MODULE LOCATIONS WITH 16 CHANNEL OPERATION

Figure 2.1 Output Module Location for AMC-21-[4][8][12][16]

2.2.5 Compl ting the Installation

Coaxial cables from the receivers can now be connected to the output module. It is not necessary to connect receivers or otherwise terminate all output module ports. Open circuit outputs will not adversely affect the performance of the multicoupler. Re-apply primary power and the multicoupler is ready for operation.

2.3 Input Filter Installation

2.3.1 General

Installation of an input filter is slightly more involved than installation of an output filter. However, a technician with basic skills in soldering techniques is fully capable of completing the procedure in under fifteen minutes.

2.3.2 Tools Needed for Filter Installation

Three items are needed to complete the input filter installation: 1) a small Phillips-head screw driver; 2) a low-power (60-watt maximum) soldering iron; and 3) a small amount of 60/40 alloy solder. The screw driver is used to remove the top and bottom covers of the multicoupler, and to anchor the filter assembly to its supporting bracket. The soldering iron and solder are used to complete the electrical connection of two, small leads to the filter assembly from the multicoupler.

2.3.3 Preparing for Installation

Remove primary power from the multicoupler by disconnecting the primary power cable. Orient the unit so that the front panel is facing forward and the unit is lying flat. Using the screw driver, remove the four machine screws securing the top cover. Two of the screws are located along the rear edge and the other two along each side edge. Lift the top cover to expose the internal circuits of the multicoupler. Along the left-hand side of the chassis is the mounting bracket used for the input filters. A shaft from the front panel selector switch passes through the center of this bracket. The bracket is sandwiched between two, prewired switch wafers. Colored wire leads are soldered to these wafers and are used to connect the input filters. Refer to Figure 2.2 for a diagram of the bracket assembly, including the switch wafers and wire leads. To access the bottom of this bracket, simply remove the bottom cover of the multicoupler. By convention, the low pass filter is mounted on the top of the bracket; the high pass filter is mounted on the side; and the broadcast stopband filter on the bottom.

2.3.4 Installing the Input Filter

Each of the filters is installed in exactly the same manner. Locate the leads corresponding to the filter selected. The BROWN leads are used for the FX10020 low pass filter; the RED leads are used for the FX10021 high pass filter; and the ORANGE leads are used for the FX10022 broadcast stopband filter. Position the filter assembly adjacent to its location on the mounting bracket with the component side facing IN and terminal "1" towards the rear. Remove the protective shrink tubing covering the corresponding leads and solder these two leads to terminals "1" and "2" on the filter board. Position the filter board on the mounting bracket and secure with the four machine screws provided.

2.3.5 Completing the Installation

Replace the cover(s) and secure with four machine screws. Re-connect the primary power cable and the multicoupler is ready for immediate use.

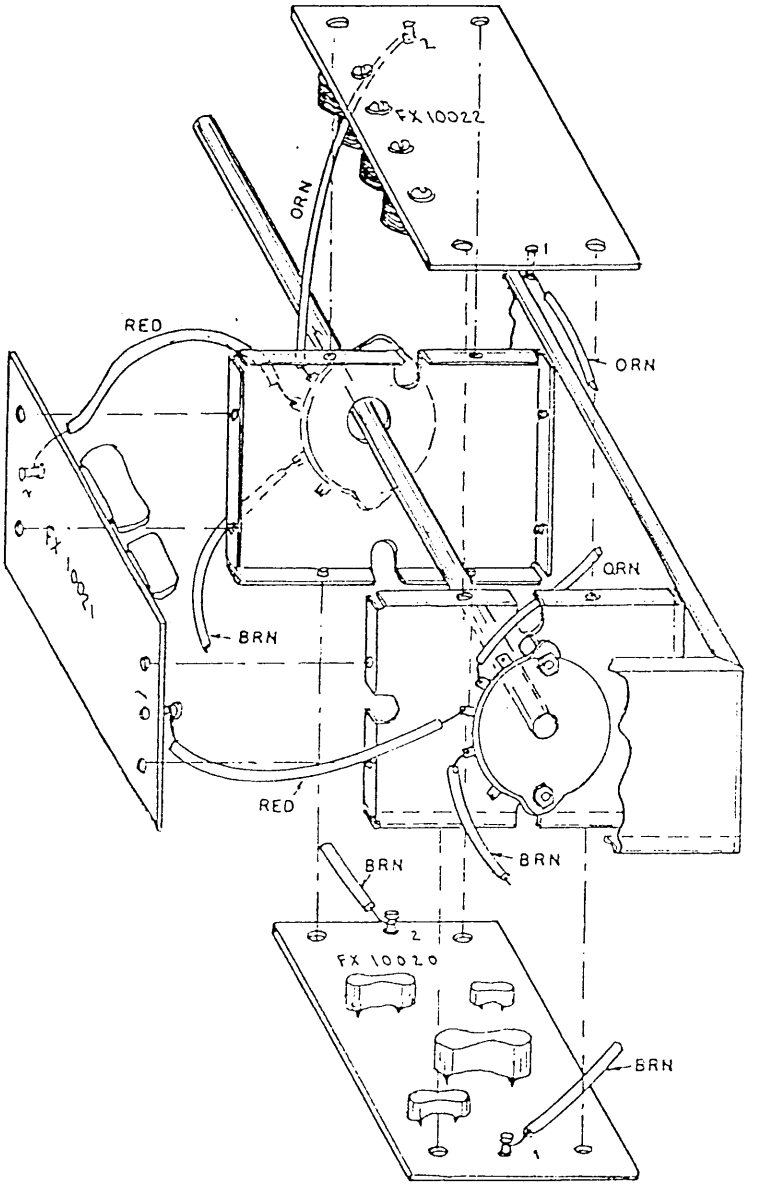


Figure 2.2 Input Filter Assembly

2.4 Electrical Installation

2.4.1 Primary Power

The AMC-21 operates from a 115VAC, 48 to 400Hz power source. Optionally, the AMC-21 may be wired for 230VAC, which will be noted by a decal on the rear panel adjacent to the input power connector.

2.4.2 External Connections

The following external connections must be made to the AMC-21 after it has been installed in an equipment rack:

Antenna

The antenna cable must be fitted with a connector that mates with the AMC-21 connectors provided. Normally, this is a BNC-type connector (UG-88/U), although type N adapters are also available. The antenna cable is connected to ANTENNA INPUT jack J1 on the rear panel of the AMC-21.

Power

Connect primary power to the unit by plugging the supplied power cable assembly into POWER INPUT connector J2 on the rear panel. Ensure that the plug lines up properly with the socket using the keyway as a guide.

Outputs

Connect the outputs of the AMC-21 to the assocated receivers via the RF connectors mounted to the rear panel. RF coaxial cables, terminated with the proper mating connectors, are required for this connection.

2.4.3 Clearance Requirements

The AMC-21 equipment should be located in such a way that sufficient clearance is obtained at the rear of the unit for making all RF connections. The front panel controls should also be within easy reach of an operator. The solid state design of the AMC-21 reduces heat problems, allowing "stacking" of up to five AMC-21 units, one above the other, in the same rack. If more than five units are stacked, heat-related problems may occur after prolonged use of the multicouplers. To reduce the possibility of this happening, the equipment cabinet should be fitted for forced air cooling or the couplers should be separated vertically by sufficient space to allow dissipation of the heat into the operating area.

2.5 Performance Check

2.5.1 General

When the appropriate power connections have been made to the AMC-21, turn the POWER switch S2 to the ON position. The POWER lamp DS1 will light, indicating that the AMC-21 is ready for use. No further checks are required.

Table 2.1 - Loose Items Supplied

CA10625	Power Cable Assembly	1 each
210308C	Technical Manual	1 each
UG88/U	Mating Connectors	Optional extra

3.1 General

3.1.1 Controls

Table 3.1 contains a list of the operating controls and indicators that are located on the front panel of the AMC-21.

3.1.2 Procedures

After connecting the antenna, communication receivers and power supply, and turning on the POWER switch, no further operating procedures are required. The AMC-21 is now fully operational without further adjustment.

Table 3.1 Controls and Indicators

Power ON/OFF switch S2	Controls primary power application
POWER lamps DS1	Lights when primary power is applied and switch 1S1 is turned ON.
FUSE holder/indicator F1,F2	Indicates failure of fuse by illumination of the fuseholder.
SPARE fuse	Two spare fuses are contained in spare fuseholders located on the front panel.
FILTER switch S1	Position 1 - Broadcast band stop filter Position 2 - High pass filter Position 3 - Low pass filter OUT - No filters in input circuit

4.1 General

4.1.1 Capabilities

The Model AMC-21 Medium/High Frequency Antenna Multicoupler is a broadband antenna distribution system, designed to couple one MF/HF antenna to the antenna inputs of up to sixteen communication receivers.

4.1.2 Input/Output

Both the input and output impedance of the AMC-21 multicoupler is nominally 50 ohms, and optionally 70 ohms. The standing wave ratio characteristic is better than 1.2-to-1 over the frequency range of 100kHz to 40MHz.

4.1.3 Salient Performance Features

The AMC-21 multicoupler provides a nominal insertion gain of 2dB from the antenna input to each connected receiver. The coupler is designed to ensure minimum noise generation, and to provide a high degree of intermodulation rejection and isolation between the connected receivers. The rejection and isolation figures for this equipment are stated in the Technical Specifications section of this manual (See Section 1.3).

4.1.4 Equipment Structure

The AMC-21 multicoupler consists of four major sections as shown in System Block Diagram (Figure 4.1) and as is described in the following paragraphs. These sections consist of the preamplifier assembly; the output buffer assemblies; the regulated power supply; and the optional input filters.

4.2 Preamplifier (A10735)

4.2.1 Location and Features

The preamplifier is mounted on a printed circuit board. It is a low-noise, wideband amplifier having a 50-ohm impedance and a nominal voltage gain of 8dB. Figure 4.2 depicts its location in the chassis, while Figure 7.3 can be used to locate components and Figure 7.2 is the schematic diagram.

4.2.2 Circuit Analysis

The input to the preamplifier circuit is applied to step-up transformer T1 via pin 1. The voltage level across the secondary of T1 is fed through buffer transistor Q1 to a complimentary push-pull amplifier circuit consisting of transistor Q2 and Q3. The latter circuit acts as a balancing device minimizing intermodulation products at the preamplifier output. Compensation for temperature variation is provided by diode CR1. R6 functions as an adjustment for the standing current in the output circuit. The output signal appears at the output terminal (pin 2) after passing through DC blocking capacitor C7.

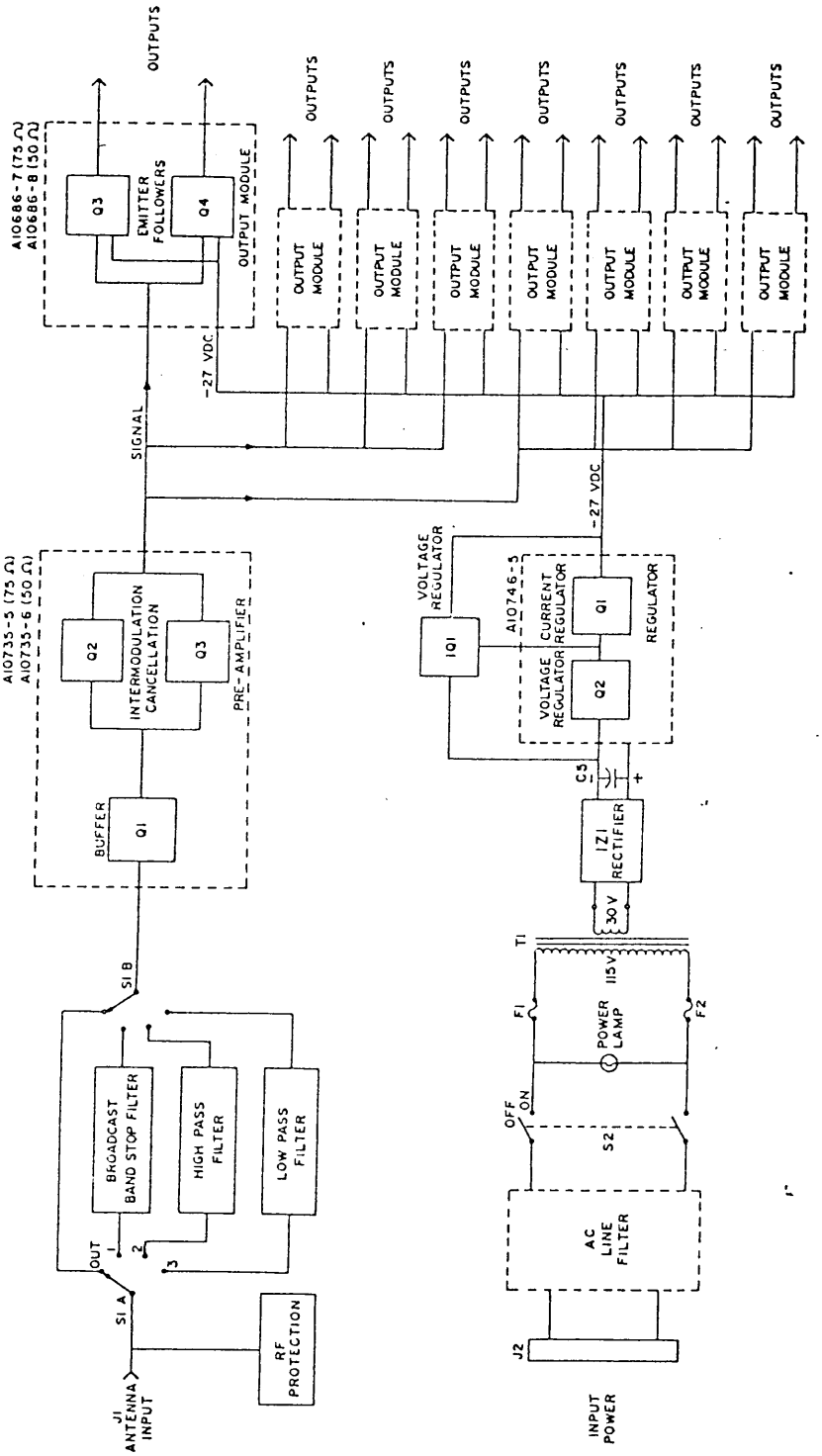


Figure 4.1 System Block Diagram

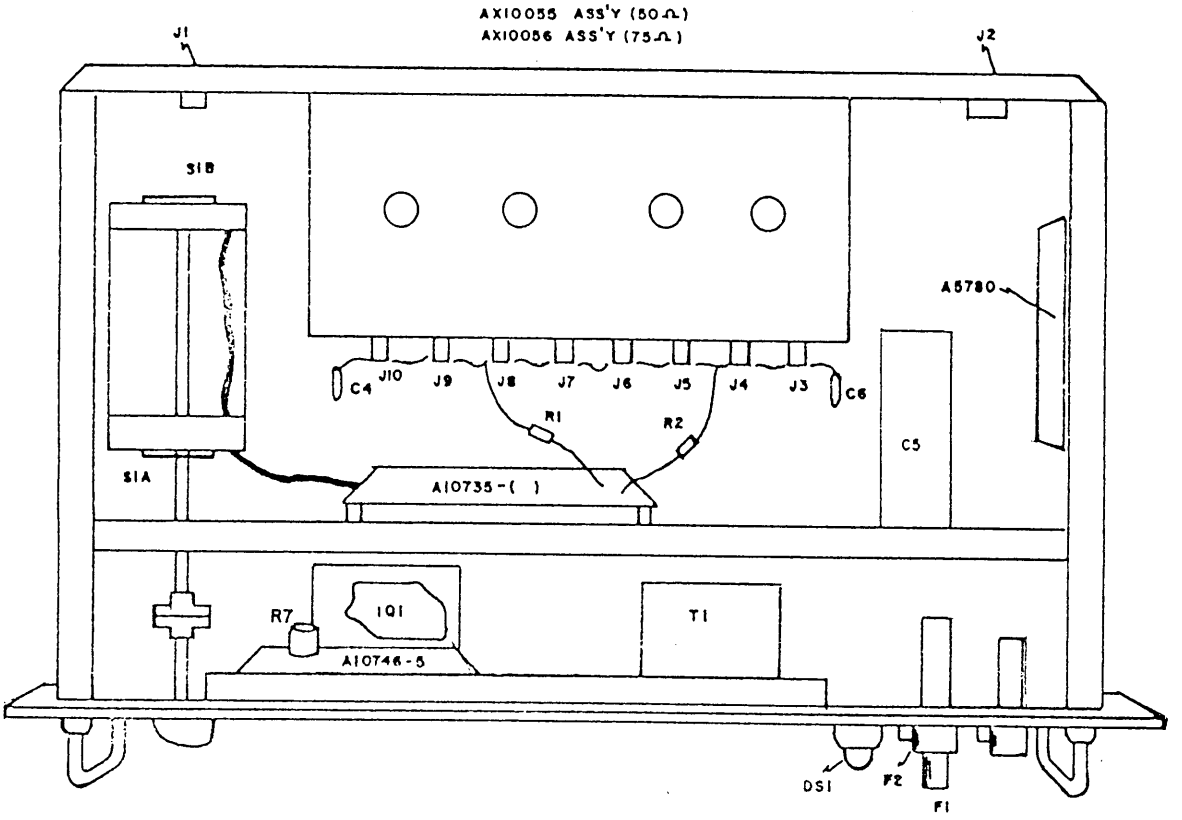


Figure 4.2 Assembly Line Drawing [Top View]

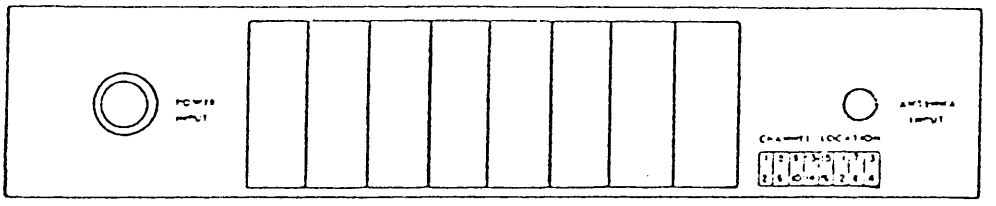


Figure 4.3 Assembl;y Line Drawing [Rear View]

4.3 Output Buffer Amplifi r (A10686)

4.3.1 Location and Features

The RF distribution line parallel-feeds identical buffer amplifier assemblies, as shown in Figures 4.2 (assembly), 7.4 (schematic) and 7.5 (components). Each amplifier assembly consists of emitter-follower amplifiers, with an output impedance of 50 ohms and an attenuation of 6.5dB. Therefore, the overall nominal multicoupler insertion gain from the antenna to each output is +2dB. Two buffer amplifier assemblies are mounted on one output module, which have identical low impedance outputs. This provides for two output channels per module. The modules are fully interchangeable so that any module may be plugged in to any position.

The position of the output modules is important when fewer than the full complement of eight modules (16 channels) is used. In order to minimize intermodulation distortion and to balance the RF feed line from the preamplifier to the output modules, the arrangement must be k pt symmetrical as shown in Figure 2.1 for four, eight, 12 and 16 channel operation.

4.3.2 Circuit Analysis

The output module circuits consist of two separate emitter-followers, Q3 and Q4. The output impedance is normally either 50 or 75 ohms (nominal) unbalanced, but other output circuits can be provided on special order. The input appoears at pin 5 and is fed simultaneously into the two identical emitter-follower circuits through resistors R4 and R5, and isolation capacitors C3 and C4, respectively. Two outputs are taken from the emitters of Q3 and Q4, through matching resistors R12 and R13, and DC blocking capacitors C5 and C6, to two RF connectors at the output.

4.4 Pow r Supply and Regulator (A10746)

4.4.1 Location and Features

The components comprising the power supply are all chassis mounted except for the regulator circuit which is mounted on circuit assembly A10746. The latter is described in the following paragraphs (See Figures 4.2, 7.6, 7.7 and 7.8).

4.4.2 Circuit Analysis

Primary power is applied to power ON/OFF switch S2 through an AC line filter, A5780, which removes any RF content from the line. When the switch is in the ON position, the input power is provided through fuses F1 and F2 to power transformer T1 and POWER indicator DS1. Jumper connections required across the primary winding of T1 to adjust for 115 or 230VAC inputs are shown in Figure 7.1. T1 secondary produces 28VAC as required by the regulator circuit. A diode bridge 1Z1 provides rectification, and smoothing is achieved by the electrolytic capacitor C5.

4.4.3 Current and Voltage Regulation

The regulator circuit board assembly and transistor 1Q1 provide the voltage and current regulation required for the -27VAC supply. All components in this section, with the exception of transistor 1Q1, are mounted on printed circuit assembly A10746. Potentiometer R7 is used to set up the initial -27V required by the AMC-21.

Transistor Q2 and diodes CR1and CR2 form a voltage reference circuit (sensitive to temperature and load changes) which in turn control Darlington-connected transistors Q1/1Q1. In addition to providing short-circuit protection, this also provides the necessary voltage and current regulation for the power supply. The -29VAC output from Pin 6 of the regulator board is filtered through L1 and C1, which are chassis mounted, and then fed to the circuit boards.

5.1 General

5.1.1 Test Equipment Requirements

This section describes preventive maintenance, trouble-shooting and repair procedures for the AMC-21. The following equipment is suggested in order to perform these procedures properly:

- RF Signal Generator, H/P Model 651B or equivalent
- Oscilliscope, Tektronix Model 545 or equivalent
- Standard Volt-Ohmmeter

5.1.2 Component Location

For aid in the location of components, refer to Figures 4.2, 7.3, 7.5 and 7.6.

5.2 Preventive Maintenance

5.2.1 General Cleaning Methods

Preventive maintenance for the AMC-21 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.

5.2.2 Visual Check and Adjustment

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, warped printed circuit boards and damaged wiring or cables. Any deteriorating component should be replaced immediately. All hardware should be checked during preventive maintenance inspections.

5.3 Troubleshooting

5.3.1 General Failure Symptoms

During operation of the AMC-21, the following failure symptoms may be observed:

- No signal output from one or all receivers.
- Weak or noisy signals in one or all receivers.

5.3.2 Fault Localization

The primary objective of the troubleshooting procedure is to localize the fault to a particular section of the coupler unit. Table 5.1 provides a guide to locating and correcting the possible failures.

Table 5.1 - Troubleshooting Procedures

Symptom: No signal output at one or more receivers

Possible Cause:	Receiver failure (One output affected)
Remedial Action:	Refer to receiver manual
Possible Cause:	Interconnection, coupler to receiver (One output affected)
Remedial Action:	Check the RF cable between the receiver and coupler
Possible Cause:	Power supply failure in the coupler (All outputs affected)
Remedial Action:	If POWER ON lamp DS1 is not illuminated, check for power input failure or defective input filters. If POWER ON lamp is on, check indicating type fuses F1/F2 and replace with spare if necessary. If both fuses are intact, proceed to check the transformer T1, bridge rectifier 1Z1 and voltage regulator. -28VDC should be available at terminal 6 of the regulator board.
Possible Cause:	Output buffer amplifier failure (One output affected)
Remedial Action:	If DC voltage is present at the output of the regulator and at the output buffer amplifier, possible failure of a component in the output amplifier is indicated. Removal, testing and repair of the module A10686 will be necessary.
Possible Cause:	Failure of input preamplifier (All outputs affected)
Remedial Action:	If DC voltage is present at the output of the regulator and at the preamplifier, possible failure of a component in the preamplifier or failure in the input antenna circuit is indicated. For repair of the preamplifier, removal and testing of the module A10735 will be necessary.

Symptom: Weak or noisy signals to ALL receivers

Possible Cause:	Antenna fault
Remedial Action:	Connect the antenna lead-in directly to the antenna input of the receiver. If the symptom persists, check for a fault in the antenna system.
Possible Cause:	Faulty preamplifier
Remedial Action:	If the cause is not attributable to the antenna, possible failure of a component in the preamplifier is indicated. Removal, testing and repair of module A10735 will be necessary.

Table 5 - Troubleshooting (Continued)

Symptom: Weak or noisy signals in ONE receiver

Possible Cause:	Receiver noise
Remedial Action:	Refer to receiver manual
Possible Cause:	Interconnection, coupler to receiver
Remedial Action:	Check the RF cable between the coupler and receiver.
Possible Cause:	Faulty output buffer amplifier
Remedial Action:	Connect the receiver to the other output terminal of the same output module. If the symptom persists, the probable cause will be found in the power supply circuit of the module. If the symptom is no longer present, the fault will be found in the directly-associated buffer amplifier circuit or output connection. Removal, testing and repair of the module will be necessary if the fault is not located in the output connection.

5.4 Repair

5.4.1 General Method

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. This is particularly important in the amplifier modules.
- Place any new component in the same location as the component it replaces. The dressing of any wire runs should not be altered.
- Observe standard practice when replacing semiconductor components by using a low-wattage soldering iron and appropriate heat-sink tools.
- Avoid damage to the printed circuit wiring when handling or repairing amplifier and regulator modules.

5.5 Adjustments

5.5.1 Output Voltage Trim

Only one adjustment may be required in the AMC-21 multicoupler. Power supply regulator A10746 contains a screwdriver-adjustable potentiometer (R7) that was pre-set, prior to shipment, to provide a -27VDC. If the output voltage is found to require adjustment, use an accurate voltmeter and re-set the voltage to -27VDC by rotating the potentiometer control clockwise to reduce voltage or counter-clockwise to raise voltage.

5.5.2 Amplifier Trim

The amplifiers do not require any adjustment since all components are of fixed values.

A10739		Front Panel, Rear Panel and Main Chassis Ass mbly
AX10055		Output Amplifier Assembly (50-ohm operation
AX10056	#	Output Amplifier Assembly (75-ohm operation)
A10735-6		Preamplifier Assembly (50-ohm operation)
A10735-5	#	Preamplifier Assembly (75-ohm operation)
A10746-5		Regulator Assembly
A10859		RF Protection Assembly
A5780		AC Line Filter Assembly
FX10022		Low Pass Filter Assembly
FX10021		High Pass Filter Assembly
FX10020		Broadcast Band Stop Filter Assembly

 # Optional for 75-ohm operation

MAIN CHASSIS

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
C1A	CAPACITOR, FIXED, MICA: 22 pF ± 10%; 500 WVdc	CM11C220K5S
• C1B	Same as C1A	
C2	CAPACITOR, FLAT, FOIL: 0.1 uF ± 20%; 250 WVdc	CC10011-8
C3	NOT USED	
C4	CAPACITOR, FLAT, FOIL: 0.22 uF ± 20%; 250 WVdc	CC10011-10
C5	CAPACITOR, ELECTROLYTIC: 2800 uF; 50 WVdc	CE112-15
C6	Same as C4	
DS1	INDICATOR, NEON	BI100-51
F1	FUSE, CARTRIDGE: slow-blow; for 230 VAC operation, Models AMC-21C-4 and AMC-21C-8	FU102-.250
F1	FUSE, CARTRIDGE: slow-blow; for 230 VAC operation, Models AMC-21C-12 and AMC-21C-16	FU102-.400
F1	FUSE, CARTRIDGE: slow-blow; for 115 VAC operation, Models AMC-21C-4 and AMC-21C-8	FU102-.500
F1	FUSE, CARTRIDGE: slow-blow; for 115 VAC operation, Models AMC-21C-12 and AMC-21C-16	FU102-.750
F2	Same as F1	
J1	CONNECTOR, RF	UG625-B/U
J2	CONNECTOR, BOX, RECEPTACLE	MS3102R-14S-7P
J3	CONNECTOR, RECEPTACLE, FEMALE	JJ285-6
J4 to J10	Same as J3	
R1	RESISTOR, FIXED, COMPOSITION: 12 ohms ± 5%, 1/2 watt	RC20GF120J
R2	Same as R1	
R3	RESISTOR, FIXED, COMPOSITION	RC20GF104J
S1A	WAFER, SWITCH	SW1064S-W
S1B	Same as S1A	
S2	SWITCH, TOGGLE, DPST	ST22K
T1	TRANSFORMER, POWER	TF443
XDS1	LAMPHOLDER	TS106-2

MAIN CHASSIS

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
XF1	FUSEHOLDER INDICATOR:	
XF2	Same as XF1	
	OPTIONAL FILTERS:	
	BROADCAST BAND STOP FILTER	FX10020
	HIGH PASS FILTER	FX10021
	LOW PASS FILTER	FX10022
1Q1 1Z1	See Power Supply and Regulator Parts List for these items.	

50 OHM PREAMPLIFIER
A10735-6

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAPACITOR, FIXED, CERAMIC: 0.1uF	CC10015-X5V104M
C2	NOT USED	
C3	CAPACITOR, FIXED, CERAMIC: 0.1uF	CC10017-X5V103M
C4	Same as C3	
C5	Same as C3	
C6	Same as C1	
C7	Same as C1	
C8	Same as C3	
C9	CAPACITOR, FIXED, CERAMIC: 0.1uF	CC10023
CR1	DIODE	1N456A
R1	RESISTOR, FIXED, FILM: 510 ohms, 1/4 w 2%	RC07S511G
R2	RESISTOR, FIXED, FILM: 8.2 K, 1/4 w 2%	RL07S822G
R3	RESISTOR, FIXED, FILM: 3 K, 1/4 w 2%	RL07S302G
R4	RESISTOR, FIXED, COMP: 330 ohms, 1/2 w 5%	RC20GF331J
R5	RESISTOR, FIXED, FILM: 2 K, 1/4 w 2%	RL07S202G
R6	RESISTOR, VARIABLE: 500 ohms	RV10009-501AP
R7	Same as R5	
R8	RESISTOR, FIXED, COMP: 7.5 ohms, 1/4 w 5%	RC07GF7R5J
R9	Same as R8	
L1	INDUCTOR, RF COIL: 33 uh	CL275-330
L2	NOT USED	
L3	INDUCTOR, RF COIL: 220 uh	CL275-221
L4	Same as L3	
L5	Same as L3	
L6	INDUCTOR, RF COIL 1.5 UH	CL500
T1	TRANSFORMER	TR10005
Q1	TRANSISTOR, PNP	2N5160
Q2	Same as Q1	
Q3	TRANSISTOR, NPN	2N3866

75 OHM PREAMPLIFIER
A10735-5

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAPACITOR, FIXED, CERAMIC: 0.1uF	CC10015-X5V104M
C2	CAPACITOR, FIXED, MICA: 47 pF	CM04ED470G03
C3	CAPACITOR, FIXED, CERAMIC: 0.1 uF	CC10017-X5V103M
C4	Same as C3	
C5	Same as C3	
C6	Same as C1	
C7	Same as C1	
C8	Same as C3	
C9	CAPACITOR, FIXED, CERAMIC: 0.1 uF	CC10023
CR1	DIODE	1N456A
R1	RESISTOR, FIXED, FILM: 910 ohms, 1/4 w 2%	RL07S911G
R2	RESISTOR, FIXED, FILM: 8.2 K, 1/4 w 2%	RL07S822G
R3	RESISTOR, FIXED, FILM: 3 K, 1/4 w 2%	RL07S302G
R4	RESISTOR, FIXED, COMP: 330 ohms, 1/2 w 5%	RC20GF331J
R5	RESISTOR, FIXED, FILM: 2 K, 1/4 w 2%	RL07S202G
R6	RESISTOR, VARIABLE: 500 ohms	RV10009-501AP
R7	Same as R5	
R8	RESISTOR, FIXED, COMP: 7.5 ohms, 1/4 w 5%	RC07GF7R5J
R9	Same as R8	
L1	INDUCTOR, RF COIL: 33 uh	CL275-330
L2	INDUCTOR, RF COIL: 0.33 uh	CL10044
L3	INDUCTOR, RF COIL: 220 uh	CL275-221
L4	Same as L3	
L5	Same as L3	
L6	INDUCTOR, RF COIL 1.5 UH	CL500
T1	TRANSFORMER, RF	TR10005
Q1	TRANSISTOR, PNP	2N5160
Q2	Same as Q1	
Q3	TRANSISTOR, NPN	2N3866

REF SYMBOL	OUTPUT MODULE AX10055(50Ω) AX10056(75Ω) DESCRIPTION	TMC PART NUMBER
C1	CAPACITOR, FLAT, FOIL: 0.1 uF, 250 vdc	CC10011-8
C2	NOT USED	
C3	CAPACITOR, FLAT, FOIL: .047 uF, 250 vdc	CC10011-5
C4	Same as C3	
C5	Same as C1	
C6	Same as C1	
CR1	NOT USED	
J1	CONNECTOR, RF	UG625-B/U
J2	Same as J1	
L1	INDUCTOR, RF COIL: 220 uh, 500 vdc	CL275-221
L2	NOT USED	
L3	Same as L1	
L4	Same as L1	
Q1	NOT USED	
Q2	NOT USED	
Q3	TRANSISTOR, NPN, SILICON	2N3866
Q4	Same as Q3	
R1	NOT USED	
R2	NOT USED	
R3	NOT USED	
R4	RESISTOR, FIXED, COMPOSITION: 100 ohms, 5%, 1/4 w	RC07GF101J
R5	Same as R4	
R6	RESISTOR, FIXED, COMPOSITION: 4.7 K, 5%, 1/4 w	RC07GF472J
R7	RESISTOR, FIXED, COMPOSITION: 3.3 K, 5%, 1/4 w	RC07GF332J
R8	Same as R6	
R9	Same as R7	
R10	RESISTOR, FIXED, BERLM. OXIDE: 220 ohms, 5%, 1 w	RR10004-221-3RO
R11	Same as R10	
R13 *	Same as R12	
R12 *	RESISTOR, FIXED, COMPOSITION: 47 ohms, 5%, 1/4 w	RC07GF470J

POWER SUPPLY & REGULATOR
A10746-5

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAPACITOR: Fixed, ceramic, 0.1uf	CC10015-X5V104M
C2	CAPACITOR: Fixed, tantalum, 6.8 uf	CSR13G685ML
C3	CAPACITOR: Fixed, tantalum, 0.47 uf	CSR13G474ML
C4	CAPACITOR: Fixed, ceramic, 0.01 uf	CC10017-X5V103M
C5	SAME AS C3	
C6	SAME AS C1	
CR1	DIODE: Zener	IN758A
CR2	DIODE:	IN914B
R1	RESISTOR: Fixed, composition, 47 K, 1/2 w, 5%	RC20GF473J
R2	RESISTOR: Fixed, composition, 68 K, 1/2 w, 5%	RC20GF683J
R3	RESISTOR: Fixed, composition, 15 ohms, 1/2 w, 5%	RC20GF150J
R4	RESISTOR: Fixed, composition, 560 ohms, 1/2 w, 5%	RC20GF561J
R5	RESISTOR: Fixed, composition, 1.2 K, 1/2 w, 5%	RC20GF122J
R6	RESISTOR: Fixed, composition, 3.9 K, 1/2 w, 5%	RC20GF392J
R7	RESISTOR: Variable, composition, 1K, linear curve	RV111U102A
R8	RESISTOR: Fixed, composition, 6.8 K, 1/2 w, 5%	RC20GF682J
Q1	TRANSISTOR: NPN, Silicon	TX10001
Q2	TRANSISTOR: PNP, Silicon	2N5086
	The items below are electrically part of the power supply but are physically mounted on the chassis.	
1Q1	TRANSISTOR: NPN	2N3055
1Z1	DIODE NETWORK: rectifier	NW10005

RF PROTECTION P.C. BD.
A10859

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
DS1	Inicator Neon	BI10005
CR1	Diode RF Protection	IN914B
CR2	Same as CR1	
CR3	Same as CR1	
CR4	Same as CR1	
CR5	Same as CR1	
CR6	Same as CR1	
	AC FILTER ASSEMBLY - A5780	
C1	Capacitor, Fixed	CC100-32
C2	Same as C1	
C3	Same as C1	
C4	Same as C1	
L1	Coil Fixed	CL105-1
L2	Same as L1	

FILTER ASSEMBLY
FX10022

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
C2	Capacitor, Fixed, Mica	CM06FD132F03
C3	Capacitor, Fixed, Mica	CM04FD121F03
C4	Capacitor, Fixed, Mica	CM06FD102F03
C5	Capacitor, Fixed, Mica	CM06FD751F03
C6	Capacitor, Fixed, Mica	CM06FD511J03
C7	Capacitor, Fixed, Mica	CM06FD202F03
C8	Capacitor, Fixed, Mica	CM05FD391J03
C9	Same as C4	
C10	Same as C5	
C11	Same as C2	
C12	Same as C3	
L1	Coil, RF	CL10040-4
L2	Coil, RF	CL10040-5
L3	Same as L2	
L4	Same as L1	
	FILTER ASSEMBLY - FX10021	
C1	Capacitor, Fixed, Mica	CM06FD132F03
C2	Capacitor, Fixed, Mica	CM06FD102FD3
C3	Capacitor, Fixed, Mica	CM07FD103F03
C4	Capacitor, Fixed, Mica	CM04ED390G03
C5	Capacitor, Fixed, Mica	CM06FD751F03
C6	Capacitor, Fixed, Mica	CM08FD273F03
C7	Capacitor, Fixed, Mica	CM04ED470G03
C8	Capacitor, Fixed, Mica	CM06FD911F03
C9	Same as C1	

REF DESIGNATION	DESCRIPTION	TMC PART NUMBER
L1	Coil, RF	CL10040-1
L2	Coil, RF	CL10040-2
L3	Coil, RF	CL10040-3
L4	Coil, RF	CL10040-6
	FILTER ASSEMBLY - FX10020	
C1	Capacitor, Fixed, Mica	CM06FD202F03
C3	Capacitor, Fixed, Mica	CM07FD622F03
C4	Capacitor, Fixed, Mica	CM04ED220J03
C5	Same as C1	
L1	Coil, RF	CL10039-1
L2	Coil, RF	CL10039-2
L3	Same as L1	

Section 7 - Schematic Diagrams

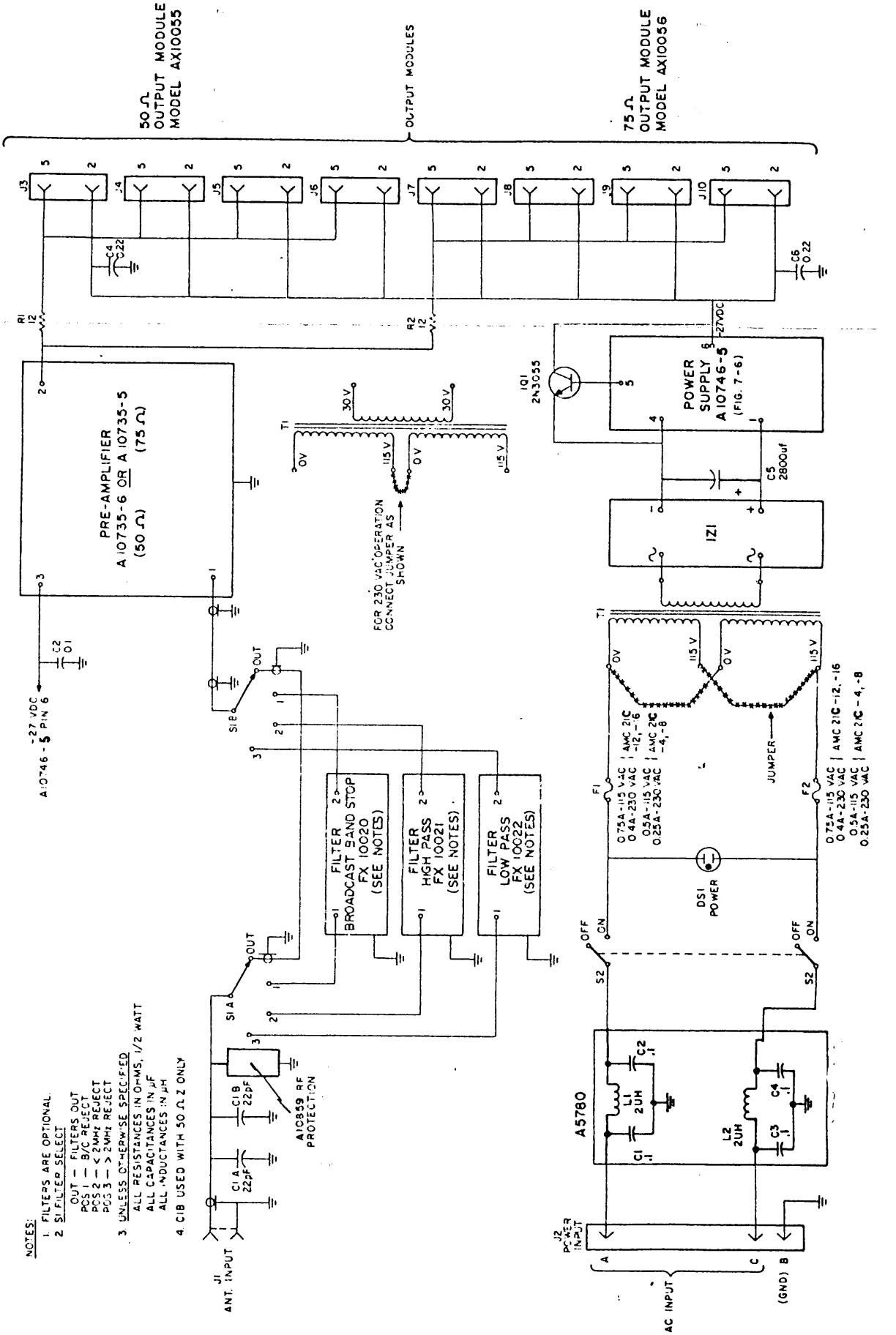
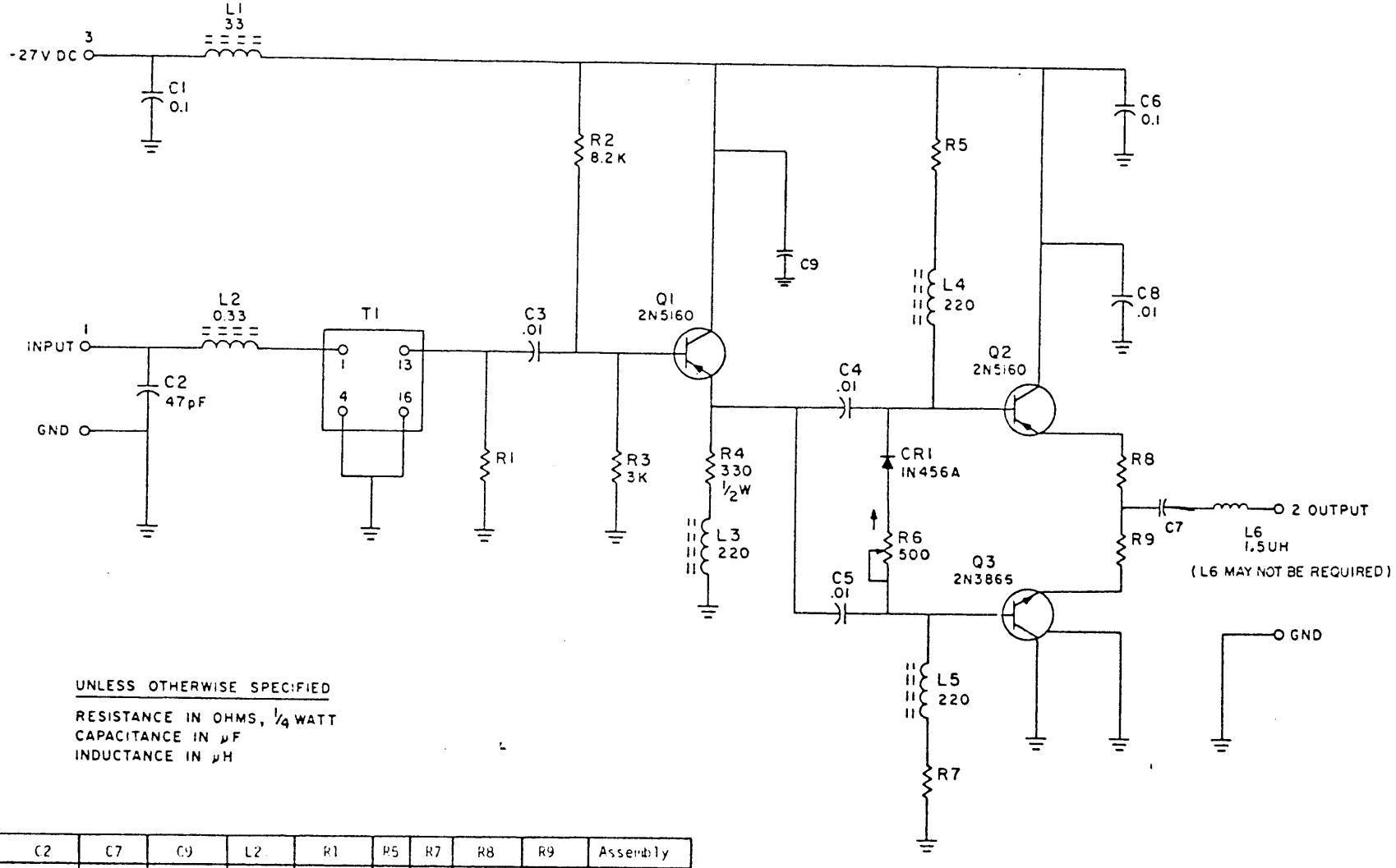


Figure 7.1 Overall Schematic Diagram

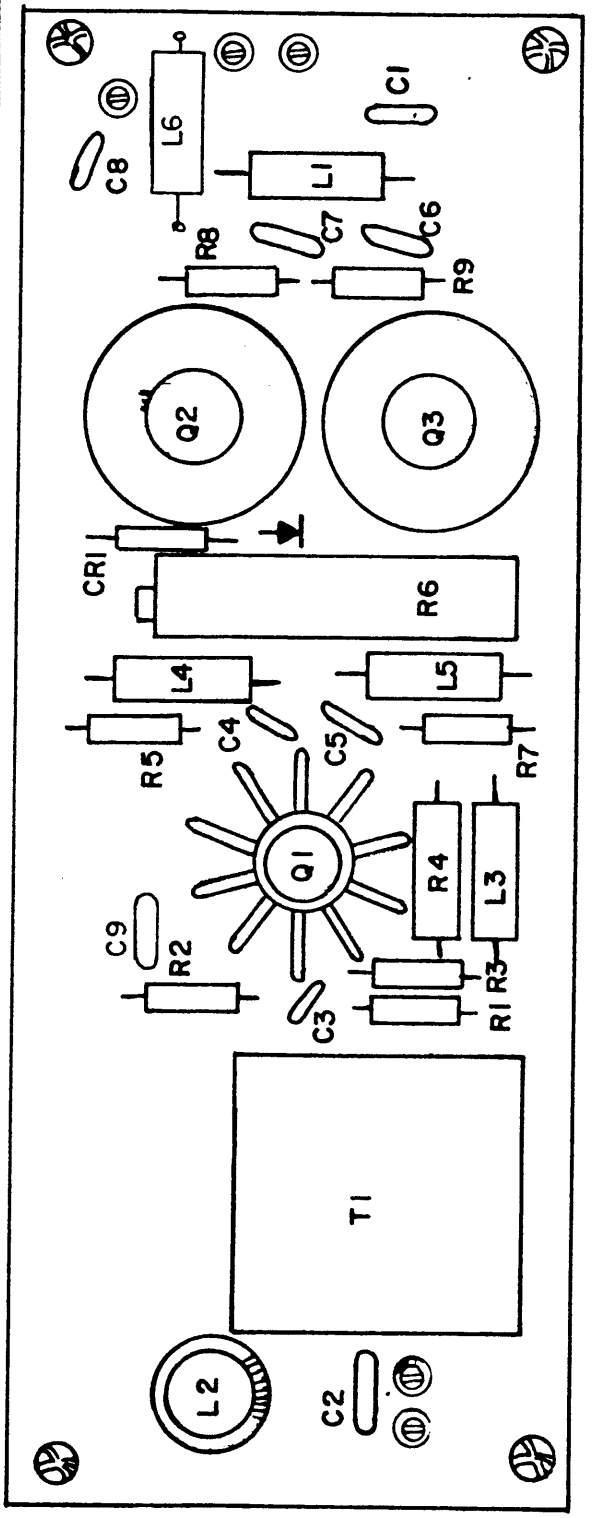


UNLESS OTHERWISE SPECIFIED

RESISTANCE IN OHMS, 1/4 WATT
CAPACITANCE IN μF
INDUCTANCE IN μH

Figure 7.2 Preamplifier Assembly (A10735)

Model	C2	C7	C9	L2	R1	R5	R7	R8	R9	Assembly
AMC-21C, 50 Ω		.1uF	.01uF		510 Ω	2K	2K	7.5 Ω	7.5 Ω	A10735-6
AMC-21C, 75 Ω	47pF	.1uF	.01uF	.33uH	910 Ω	2K	2K	7.5 Ω	7.5 Ω	A10735-5



Model	C2	C7	C9	L2	R1	R5	R7	R8	R9	Assembly
AMC-21C, 50 Ω		.1uF	.01uF		510 Ω	2K	2K	7.5 Ω	7.5 Ω	A10735-6
AMC-21C, 75 Ω	47pF	.1uF	.01uF	.33uH	910 Ω	2K	2K	7.5 Ω	7.5 Ω	A10735-5

Figure 7.3 Preamplifier Assembly

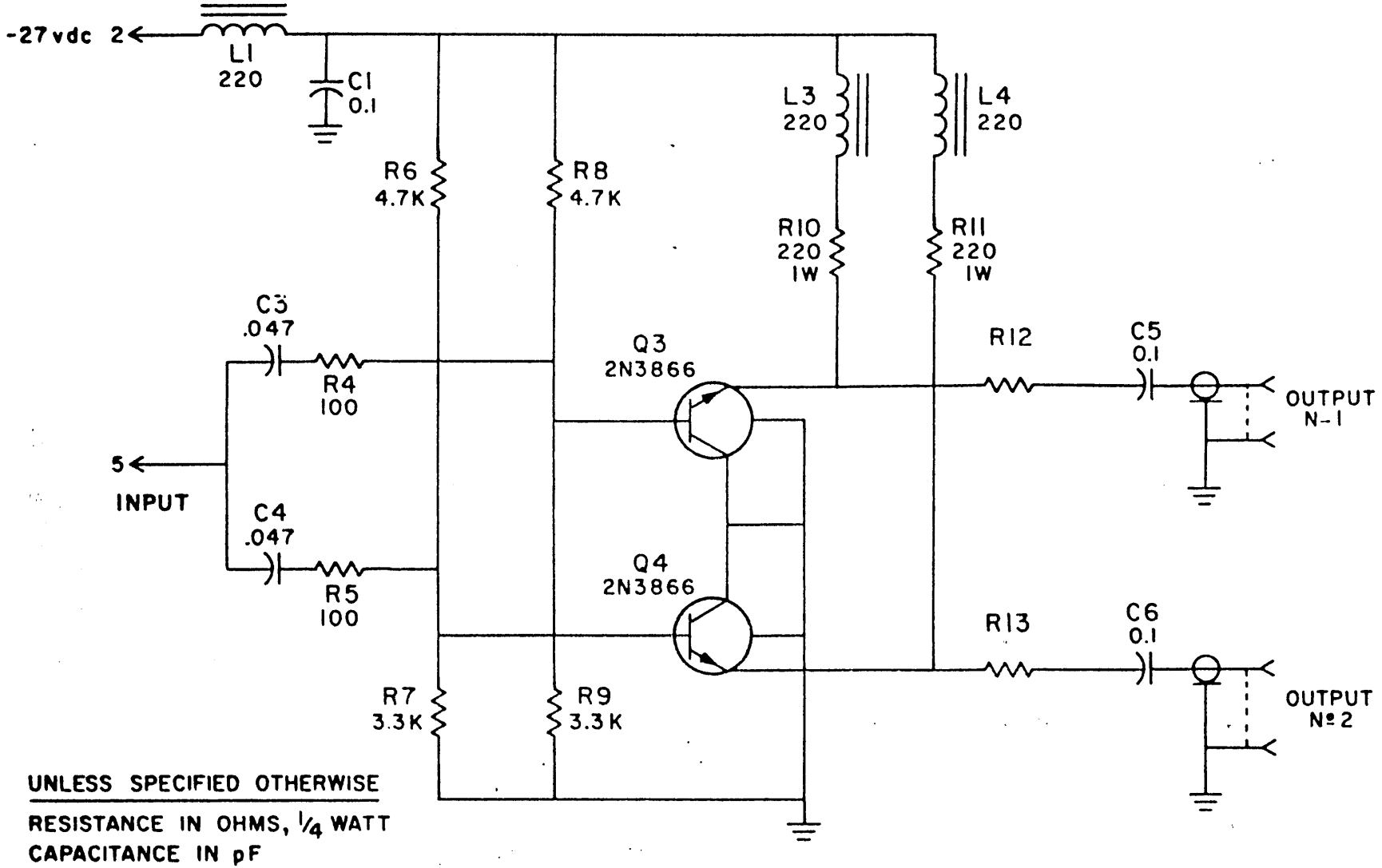
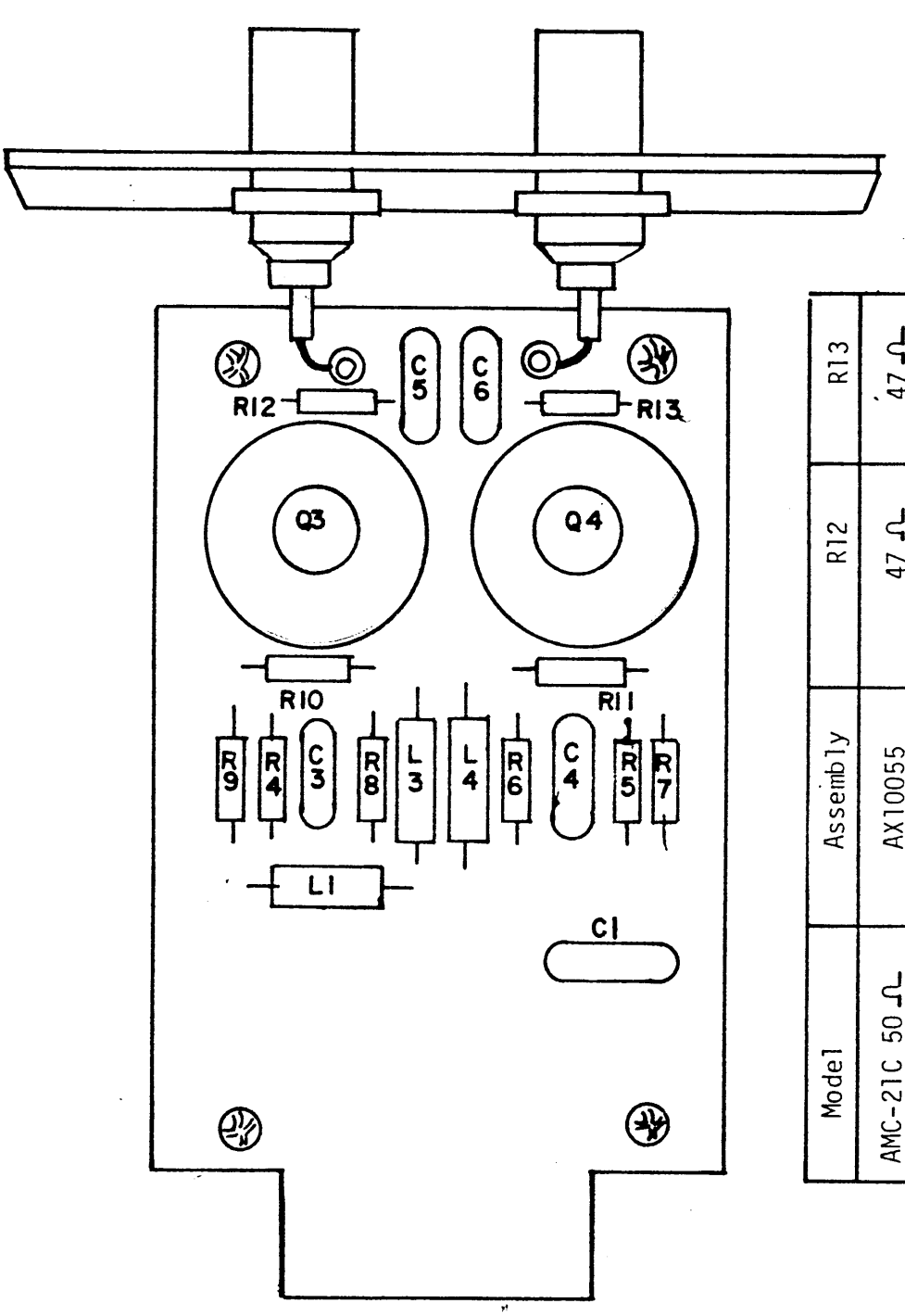


Figure 7.4 Output Amplifier Assembly (AX10055/56)

UNLESS SPECIFIED OTHERWISE

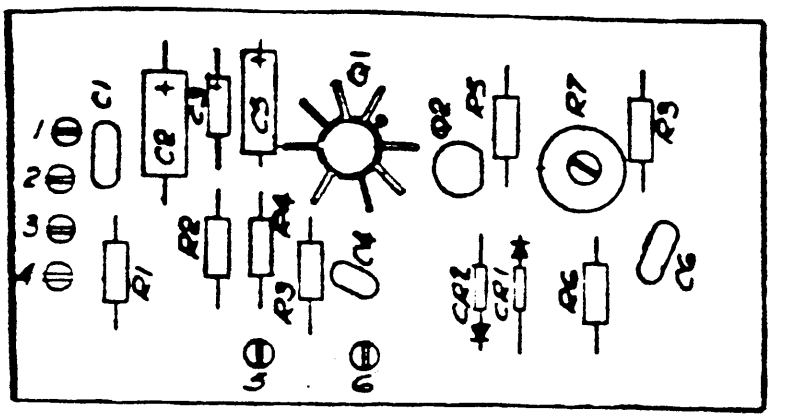
RESISTANCE IN OHMS, 1/4 WATT
CAPACITANCE IN pF
INDUCTANCE IN µH

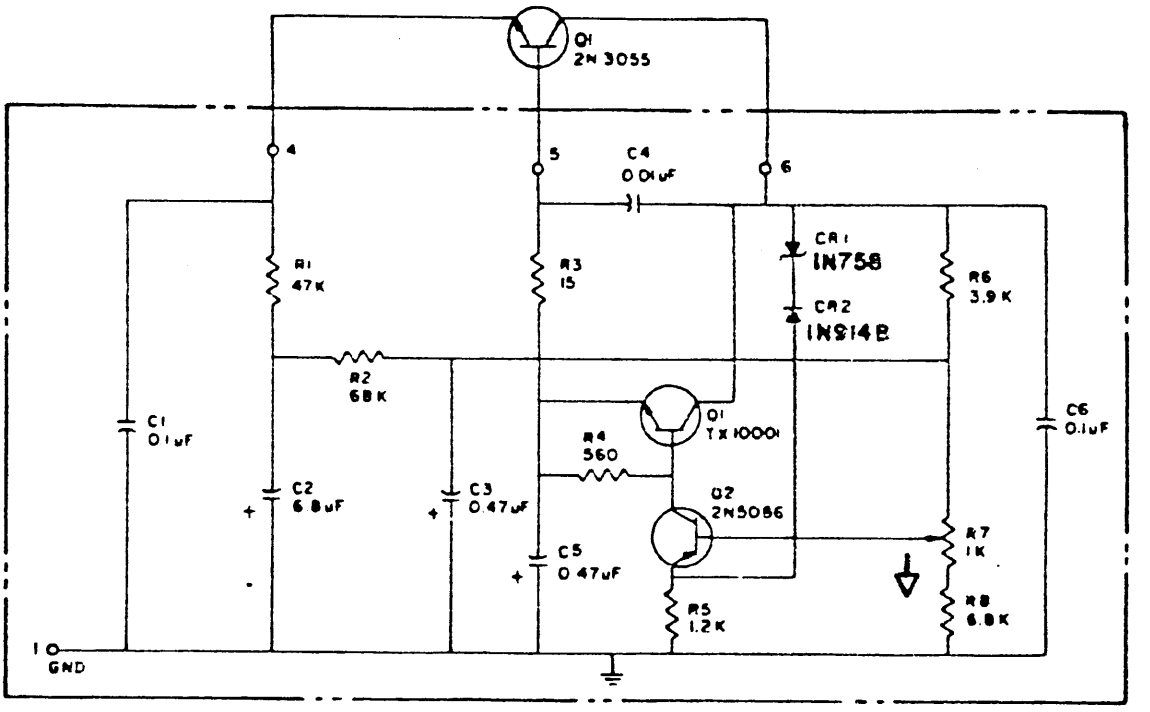
Model	Assembly	R12	R13
AMC-21C 50 Ω	AX10055	47 Ω	47 Ω
AMC-21C 75 Ω	AX10056	68 Ω	68 Ω



Model	Assembly	R12	R13
AMC-21C 50Ω	AX10055	47Ω	47Ω
AMC-21C 75Ω	AX10056	68Ω	68Ω

Figure 7.5 Output Amplifier Assembly

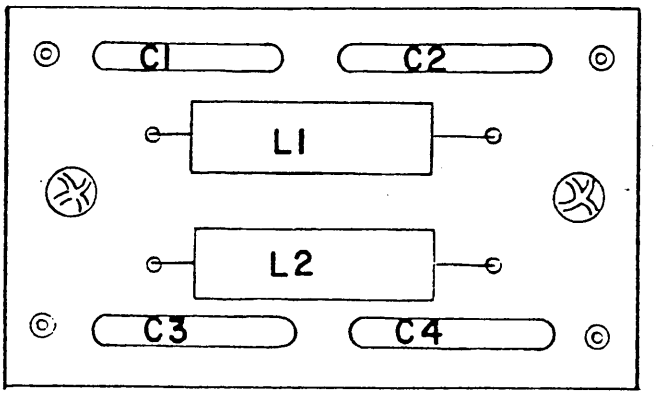




A10746-5

1. CAPACITANCE IN MICROFARADS
RESISTANCE IN OHMS .5 WATT
UNLESS OTHERWISE STATED:

Figure 7.6 Regulator Assembly



A5780

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1,C2 C3,C4	CAPACITOR: Fixed	CC100-32
L1,L2	COIL: Fixed	CL105-1

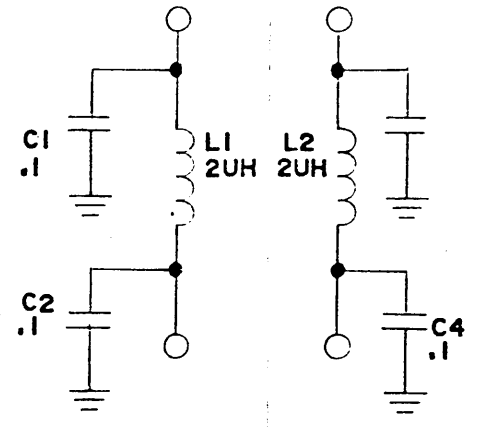


Figure 7.7 Line Filter Assembly

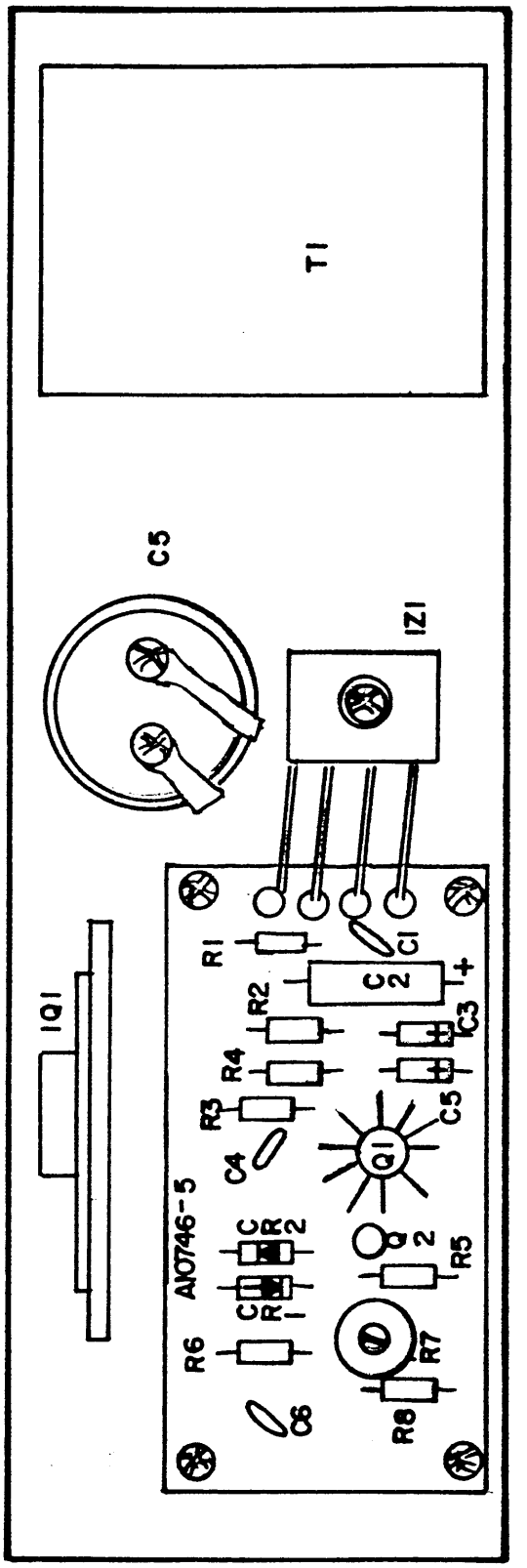
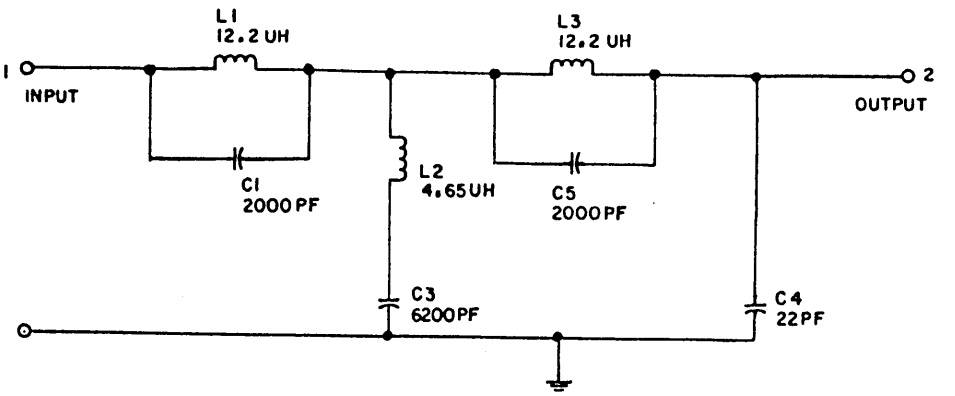
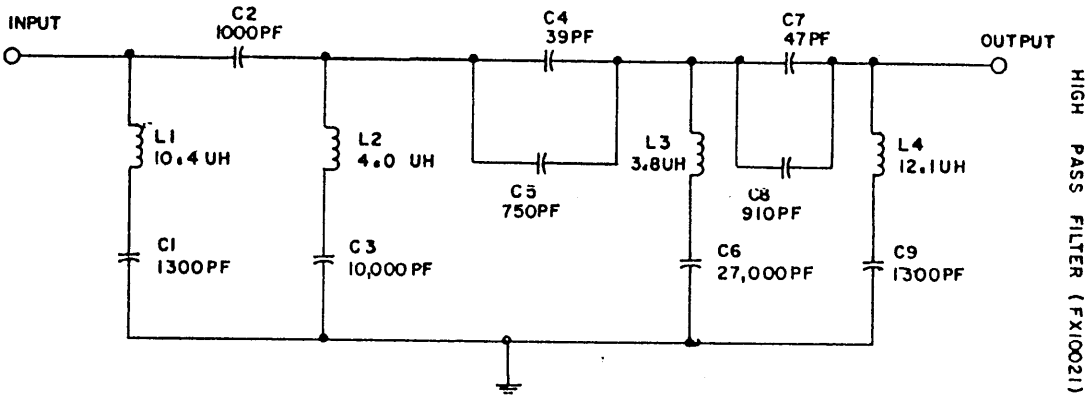


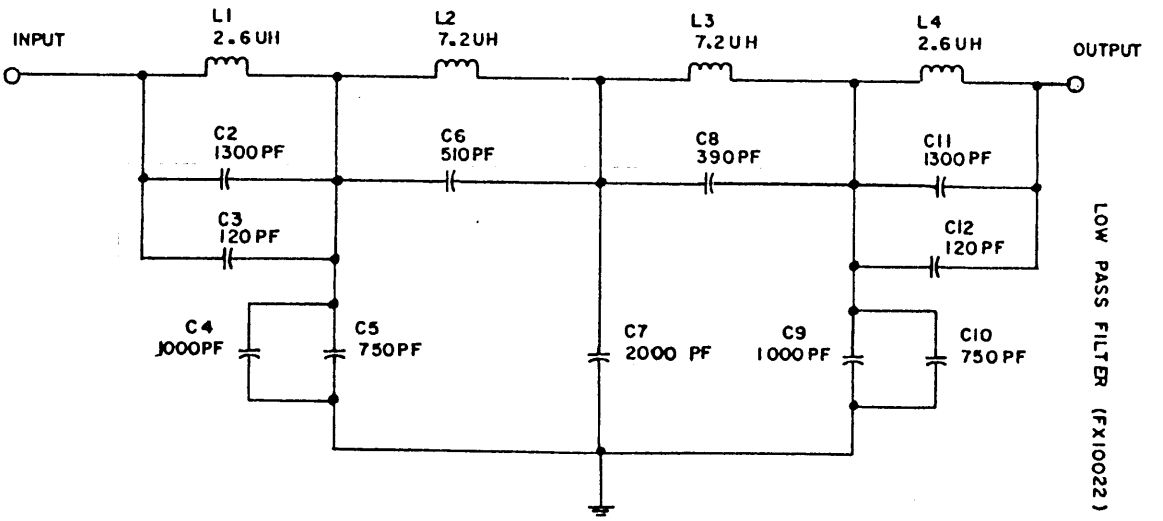
Figure 7.8 Power Supply Assembly



BROADCAST BANDSTOP FILTER (FX10020)

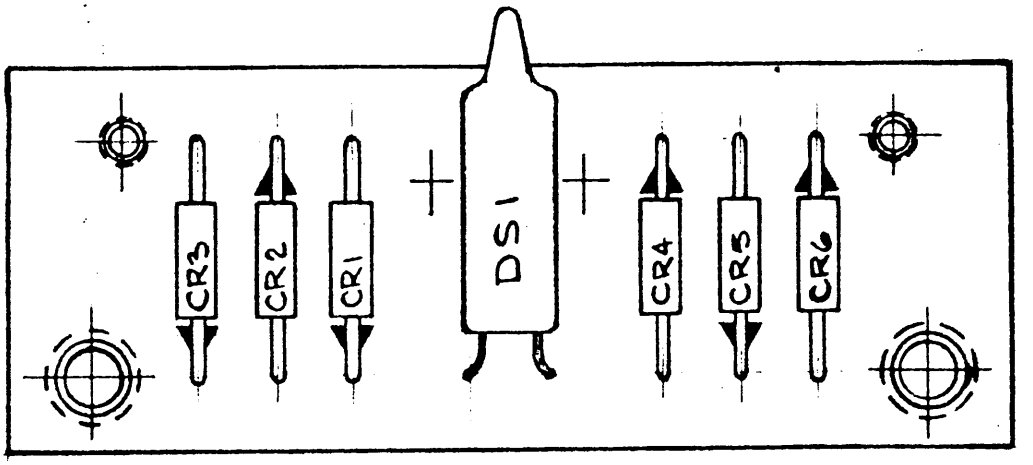


HIGH PASS FILTER (FX10021)



LOW PASS FILTER (FX10022)

Figures 7.9A, 7.9B and 7.9C
Broadcast Stopband, High Pass and Low Pass Filter Assemblies



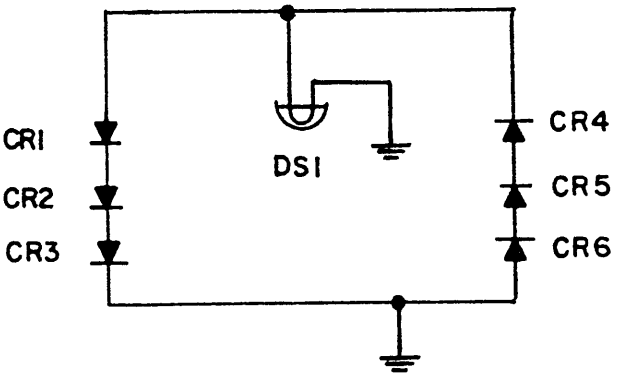


Figure 7.10 RF Protection Device Assembly

PLEASE READ THIS FIRST

Dear **TMC** Product User:

Thank you for purchasing the TMC Model AMC-21 Receiving Antenna Multicoupler. This model is one of a series of five different types that provide RF distribution from one receiving antenna to up to thirty-two communications receivers, simultaneously. The AMC-21 provides the capability of coupling four, eight, twelve or sixteen receivers to a single antenna, each with a nominal gain from antenna to receiver of 2dB. The AMC-21 operates from 100kHz to 40MHz depending on the input filters installed. Three such filters are available: 1) a bandpasss type which restricts the frequency range to 2-32MHz; 2) a low pass type with the high-end cut-off at 2MHz; and 3) a high pass type with low-end cut-off at 2MHz. A broadcast stopband filter is also available to suppress unwanted signals in the commercial broadcast frequency range.

The antenna multicoupler is described in detail in the enclosed technical manual. Product bulletins and application notes, as appropriate to the AMC-21, are also included. These publications provide important information about using TMC equipment. Please read them.

Since the AMC-21 requires mating connectors and coaxial cables to operate properly, bulletins 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 card provided in this package. Our FAX (facsimilie) number is (914) 698-4805.

If you are missing any items, please contact TMC directly or through your local sales office.

Thank you for selecting the TMC Model AMC-21 antenna multicoupler.

The Technical Materiel Corporation
Product Marketing