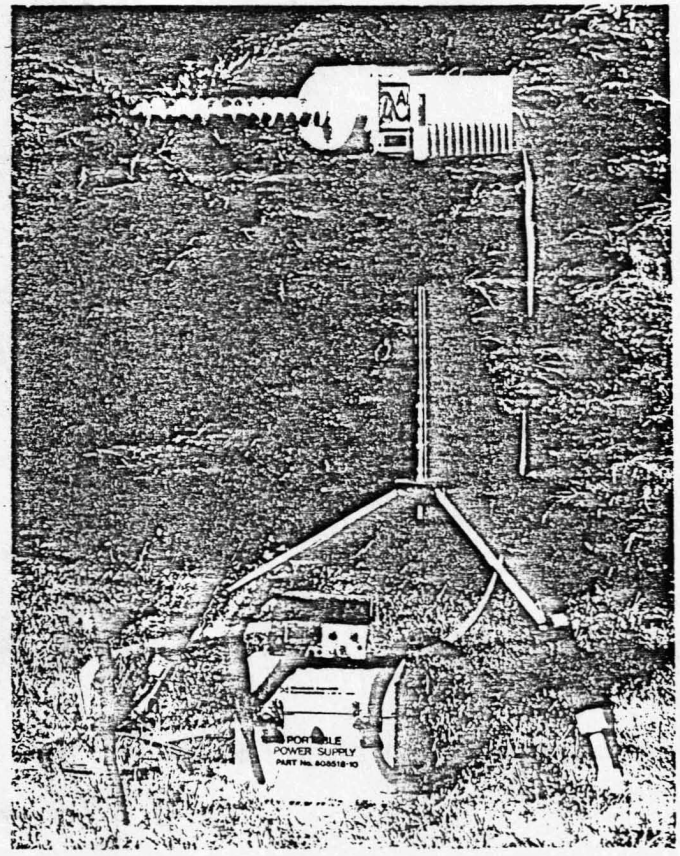
MAC PN 808771

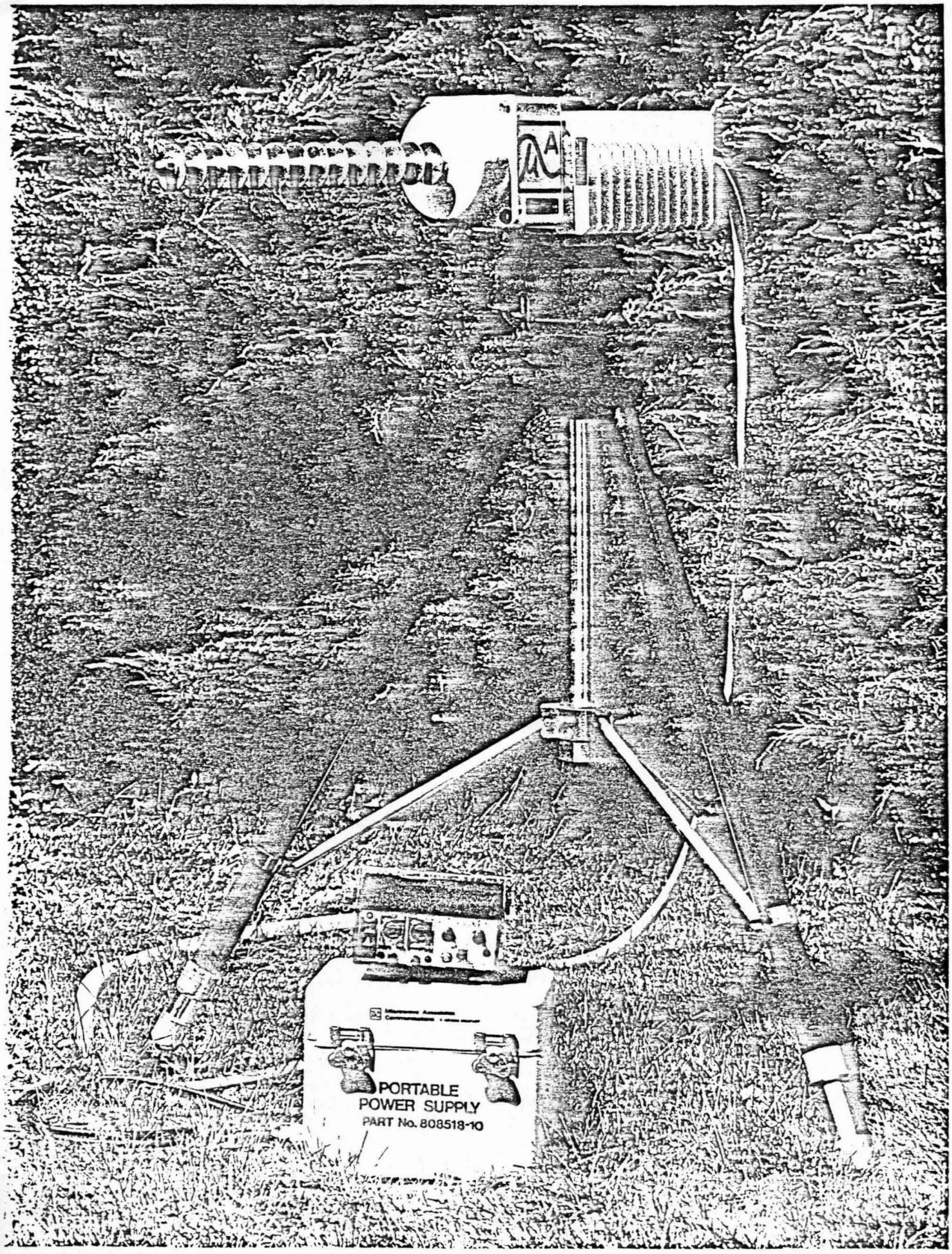
MINI-MAC™ PORTABLE ENG TRANSMITTER

PRELIMINARY

OPERATOR'S HANDBOOK



MICROWAVE ASSOCIATES COMMUNICATIONS
A MACOM COMPANY


PORTABLE
POWER SUPPLY
PART No. 808518-10

PROPRIETARY NOTICE

Specifications are subject to change in order to allow the introduction of design improvements.

MICROWAVE ASSOCIATES COMMUNICATIONS
A MACOM COMPANY

Burlington, MA 01803
Printed in U.S.A.

WARNING

*PERSONNEL WEARING PACEMAKERS **SHOULD NOT** OPERATE THIS EQUIPMENT.*

*OBSERVE PROPER PRECAUTIONARY MEASURES TO AVOID POSSIBLE EXPOSURE TO RADIATED MICROWAVE ENERGY. **DO NOT** STAND IN FRONT OF THE ANTENNA WHILE THE EQUIPMENT IS ENERGIZED*

CAUTION

Before operation of the equipment, the RF output should be properly terminated to the antenna or other suitable load.

MICROWAVE ASSOCIATES COMMUNICATIONS SUPPORT SERVICES

Microwave Associates Communications Service Department provides assistance for both routine and emergency maintenance situations.

The Customer Service Department staff is experienced in the problems associated with field service. The staff is dedicated to provide assistance on maintenance procedures and repair techniques.

Regional service centers are staffed with technical personnel and can provide replacement modules within 24 hours. For fast efficient technical assistance call the service center nearest you.

EAST COAST SERVICE CENTER (HOME OFFICE) BURLINGTON, MA

Normal Business Hours 8:00 AM – 5:30 PM	(617) 272-3100
Code-A-Phone Answering Service After 5:30 PM	(617) 272-3100
Address	Microwave Associates Communications Customer Service Department 63 Third Avenue Burlington, MA 01803

WEST COAST SERVICE CENTER

Sunnyvale, CA	(408) 734-8777

CANADA SERVICE CENTER

Missassauga, Ontario	(416) 828-2050

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SECTION 1
EQUIPMENT DESCRIPTION

INTRODUCTION

The Mini-MAC™ Portable ENG Transmitter (Figure 1-1) is a very compact, lightweight unit designed for Broadcast ENG applications that require high mobility and quick response such as helicopter air-to-ground transmissions or mobile ENG news cars. It operates in the 1.990 to 2.110 GHz frequency band and has the capability of handling a color television channel with two program audio subcarriers.

The Mini-MAC™ Transmitter is comprised of a Transmitter RF Unit and a Remote Control Unit with a single cable supplying the required interconnections. This equipment configuration permits placement of the Transmitter RF Unit adjacent to the microwave antenna to minimize cable losses while the Remote Control Unit is located near the operator. The operator can control all necessary functions via this remote unit. Functions include: channel selection, RF power output range selection, audio and video input connection, selection of line input or microphone input audio for either channel, and power ON/OFF. In addition, the operator can monitor the presence of RF power output or audio compressor action with LED indicators.

Frequency congestion is avoided with the Mini-MAC™ Transmitter which employs a high stability frequency synthesizer for multichannel flexibility. The synthesizer provides a rapid and precise channel selection capability. Each of the seven channels in the 2 GHz band is available on one switch, with a second switch providing "low side," "center," and "high side" selection. In the event of adjacent channel interference, the Mini-MAC™ can be quickly switched up or down one half channel.

The Mini-MAC™ features switchable high/low RF power output range. The operator can select either a full 12W power output for maximum range or a 1W reduced power level for short range applications. Thermal and VSWR protection is incorporated in the Mini-MAC™ to protect against inadvertent failures. The Mini-MAC™ will automatically revert to low output as necessary to protect RF circuitry. In a similar fashion, the Mini-MAC™ will protect itself against extremely high VSWR if the wrong antenna is selected or in the event of antenna damage.

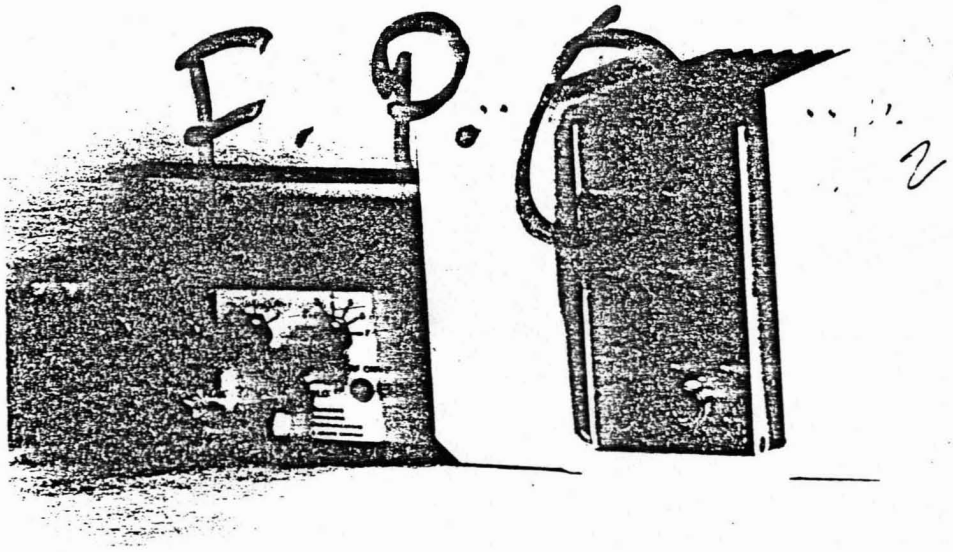
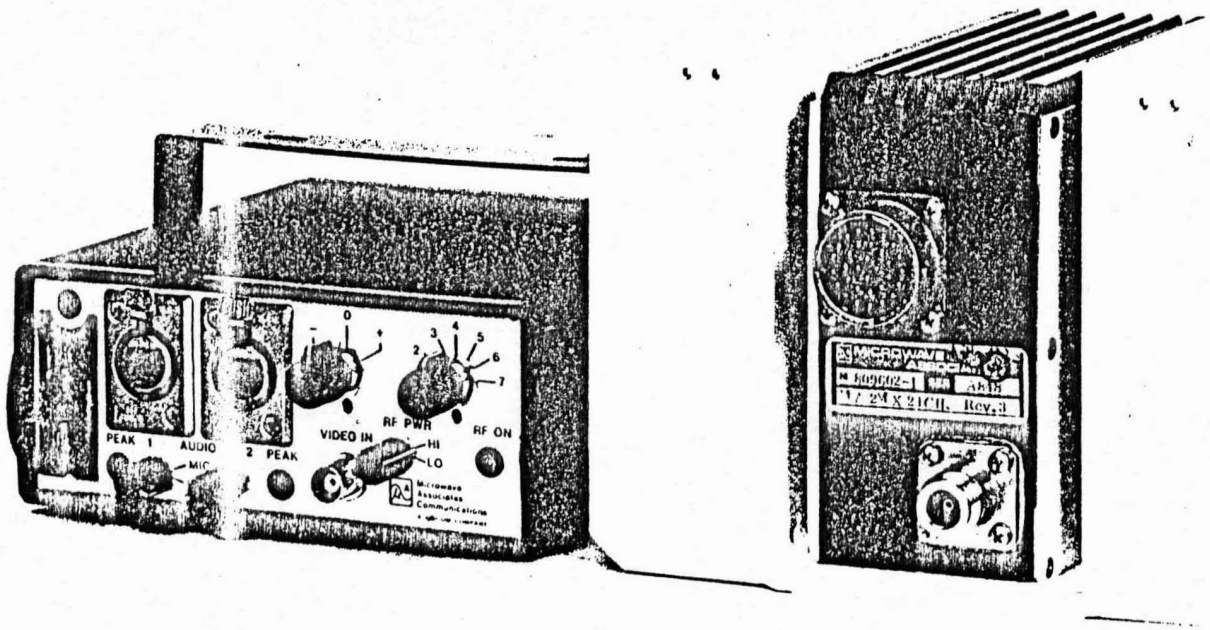


Figure 1-1. Mini-MAC™ Transmitter
(Shown With Add-On Heatsink)


PEAK 1
AUDIO
2 PEAK
MIC
VIDEO IN
HI
LO
RF PWR
RF ON
MICROWAVE

MECHANICAL FEATURES

The Mini-MAC™ is designed for a variety of mounting configurations including portable tripod, mast-mounted or helicopter installations. The Remote Control Unit can be located up to 75 feet (22.9M) away from the Transmitter RF Unit with a single cable providing the required signal and power connections.

The Mini-MAC™ Transmitter is equipped with an integral heatsink that provides adequate cooling for airborne or other applications with sufficient airflow. For nonairborne use, an optional add-on heatsink is recommended to ensure that the case temperature of the RF unit does not exceed 50°C. At temperatures above 50°C, an internal thermostatic device is actuated causing the Transmitter to operate at a reduced power level until safe operating conditions are restored, preventing damage to the unit.

The Transmitter RF Unit should be mounted so that the integral heatsink is properly oriented with the fins positioned laterally along the direction of the air flow for minimum temperature rise.

POWER REQUIREMENTS

The Mini-MAC™ Transmitter requires a 28 Vdc, 3.0A source. The self-contained power supply can accept relatively wide input variations and still provide precise-regulated voltages to the Transmitter subsystems: a capability which insures component longevity, eliminating shutdown losses and preventing unnecessary maintenance costs.

CAUTION

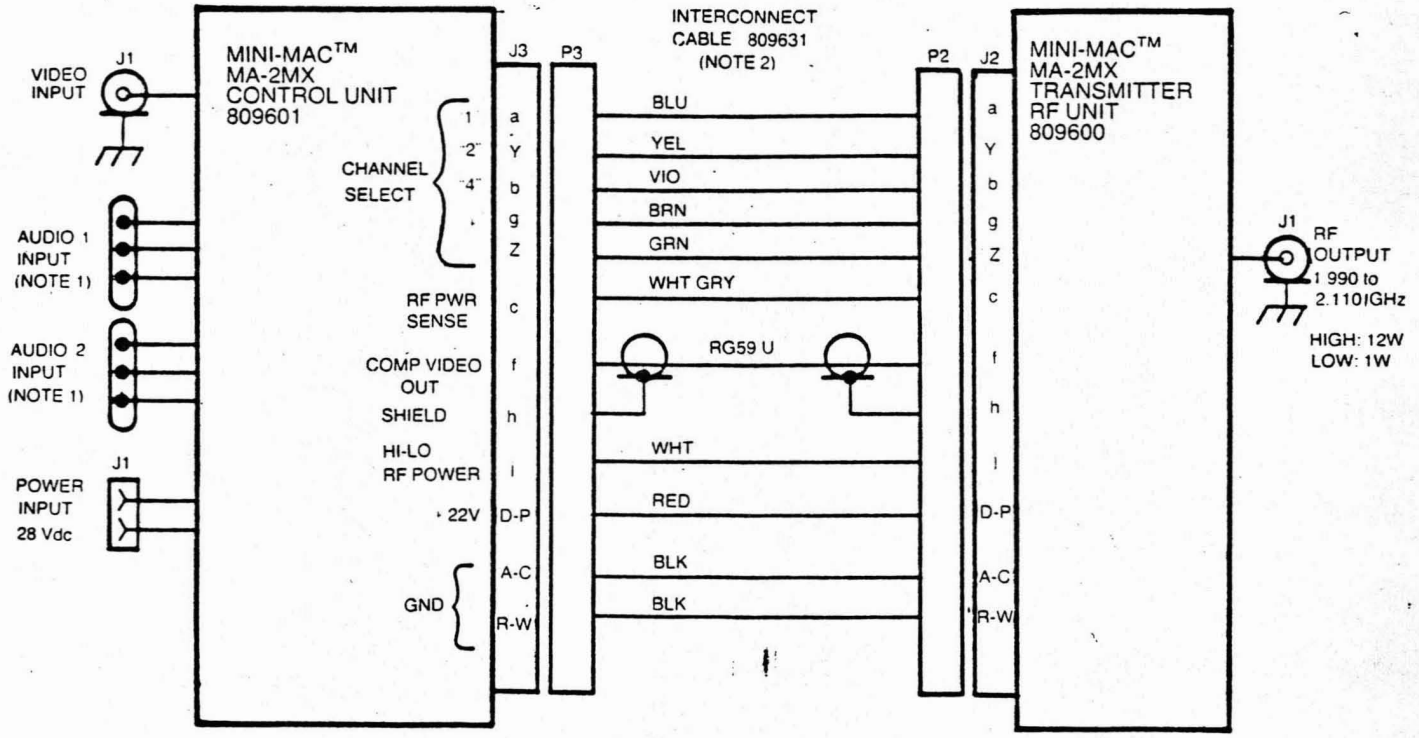
Power should be turned off and remain off until all power circuits are connected.

SIGNAL AND POWER CONNECTIONS

Except for the RF output connector, all signal and power connections are provided on the Remote Control Unit (Table 1-1). An interconnection diagram is given in Figure 1-2.

Table 1-1. Signal and Power Connections

UNIT	REF DES	MARKING	FUNCTION
Control Unit	J1	VIDEO IN	Video input signal connection.
		AUDIO 1	Microphone or line audio input signal connection. Make sure that switch (S5) is in correct position (MIC or LINE).
		AUDIO 2	Microphone or line audio input signal connection. Make sure that switch (S4) is in correct position (MIC or LINE).
	J3		Signal and power interface with RF Unit via interconnection cable.
	J4		Connect to 28 Vdc power source.
RF Unit	J1	RF OUT	RF output connection to antenna.
	J2		Signal and power interface with Control Unit via interconnection cable.



NOTES:
1. AUDIO INPUTS. 50 dBm, 200 OHM MICROPHONE OR 0 dBm 600 OHM BALANCED LINE INDEPENDENTLY SELECTABLE.
2. INTERCONNECT CABLE LENGTH UP TO 75 FT..(22.9M) PER SYSTEM REQUIREMENTS.

Figure 1-2. Mini-MAC™ Transmitter – Interconnection Wiring Diagram

SPECIFICATIONS

RF PERFORMANCE

Frequency Range	1.990 to 2.110 GHz; 2.3 to 2.7 GHz Optional
Channels	21 (7 plus offsets)
Frequency Stability	±0.005%
Power Output (Switch Selectable)	
High Range	10W minimum; 12W nominal; 15W maximum
Low Range	1.0W ± 3 dB

VIDEO PERFORMANCE

Video Standards	525 Line
Input Level	1V P-P for ±4 MHz
Input Impedance	75 ohms

AUDIO PERFORMANCE

Channels	2
Input Level	0 dBm or −50 dBm selectable
Input Impedance	600 ohms balanced line or 200 ohms balanced microphone
Deviation	75 kHz peak
Pre-Emphasis	75 μs

POWER REQUIREMENTS

Input Range	24.5 Vdc to 32 Vdc
Consumption	2.8A nominal

MECHANICAL

Size	
Transmitter	4¾" (h) x 2½" (w) x 5¾" (d) (12.1 x 6.04 x 14.06 cm)
Control Unit	2½" (h) x 6" (w) x 6¼" (d) (6.04 x 15.25 x 15.9 cm)
Weight	
Transmitter	3.53 lbs. (1.6 kg)
Control Unit	2.43 lbs. (1.1 kg)

ENVIRONMENTAL

Operating Temperature Range	−20 to +50° (case temperature)
Housing	weather-resistant, operated in rain at 15 mm/hr
Vibration	20 to 500 Hz at 3 to 5G peak

All specifications are subject to change without notice.

ACCESSORIES

A complete line of accessories is available for use with the Mini-MAC™ Transmitter. The following is a partial listing of accessory items:

- Tripod stands for portable field use.
- Mounting brackets and adapters for a variety of mounting configurations.
- Omni-directional Omnex™ antennas for aircraft or mobile applications.
- Disc Rod™ antennas for tripod or mobile mast mounting.
- Retractable helicopter mount.
- Heatsink for nonairborne applications.
- Inverters for 12 Vdc, 115/230 Vac operation.

Consult Microwave Associates Communications Systems Engineering Department for assistance in planning your installation.

SECTION 2
UNPACKING AND HANDLING

INTRODUCTION

UNPACKING. Each unit is shipped with all eqipment assembled, wired, factory-system tested, and then packaged in appropriate shipping containers. Care shall be taken when removing equipment from the container to prevent damage to the units. Ensure that all parts and accessories are removed from the container and packing material before they are discarded. Verify that equipment shipped agrees with the equipment list and sales order.

DO NOT discard the container or any packing material until mechanical inspection has been satisfactorily compited. This material must be available if a damage claim is made with the carrier.

MECHANICAL INSPECTION. Mechanically inspect the equipment for shipping damage. Make sure that the equipment is clean. and no cables or connectors are broken, damaged or loose.

NOTE

DO NOT operate any internal control as the equipment has been factory adjusted for proper operation prior to shipment and may need only minor adjustment before being placed in service.

DAMAGE IN SHIPMENT. Should any damage be discovered after unpacking the system, immediately file a claim with the carrier. A full report of the damage shall be made and a copy forwarded to Microwave Associates Communications Company. The company will then advise what disposition is to be made of the equipment.

RETURN AUTHORIZATION. Subject to standard terms of the warranty policy, Microwave Associates Communications will repair all defective equipment or component modules at its Burlington, Massachusetts factory.

Material forwarded to Microwave Associates Communications must be accompanied by a Return Authorization Tag which is available on request.

SECTION 3
OPERATING INSTRUCTIONS

SCOPE

This section describes the operating controls and indicators of the Mini-MAC™ Transmitter and contains the initial turn-on procedures for the equipment.

OPERATING CONTROLS AND INDICATORS

All operating controls and indicators for the Transmitter are located on the Remote Control Unit (Figure 3-1 and Table 3-1).

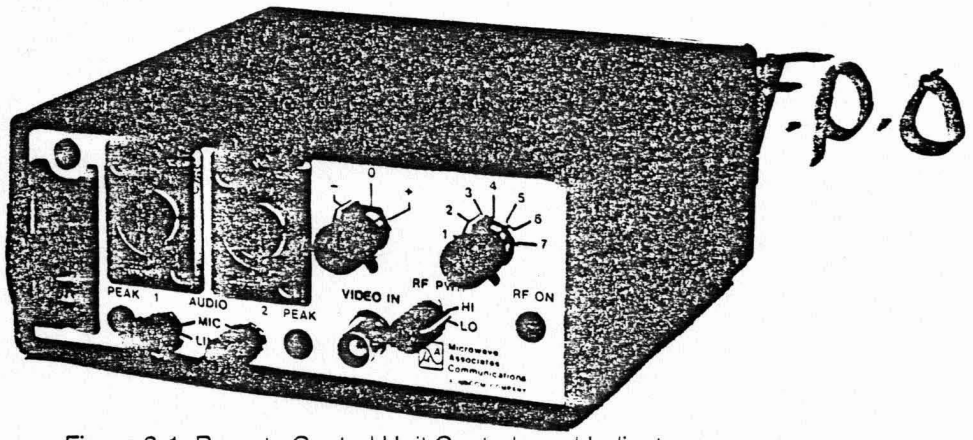
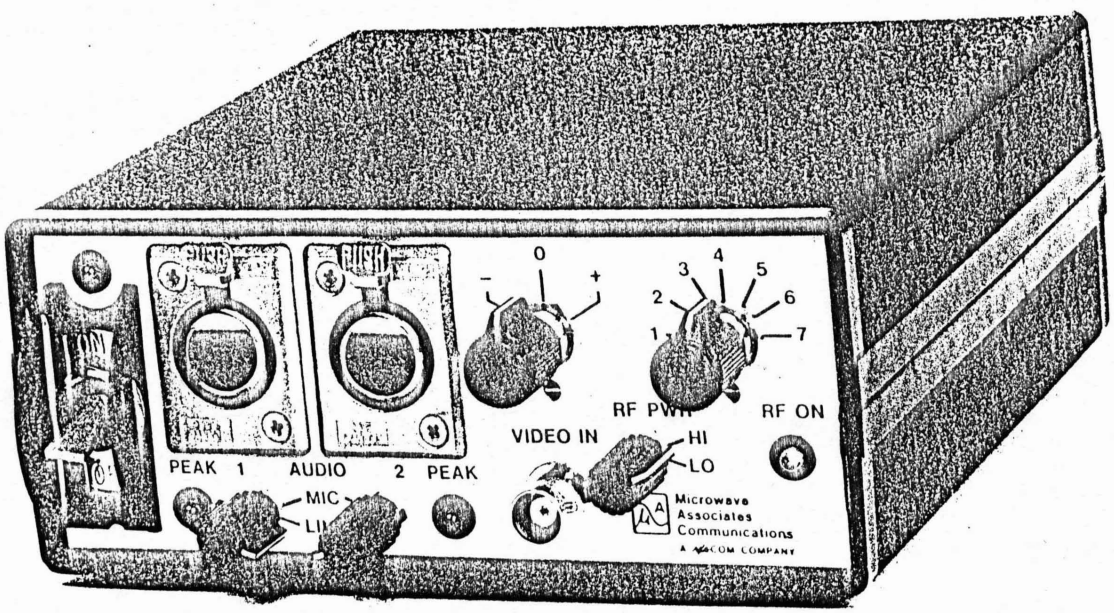


Figure 3-1. Remote Control Unit Controls and Indicators

Table 3-1. Operating Controls and Indicators

REF DES	CONTROL OR INDICATOR	MARKING	FUNCTION
CB1	Circuit Breaker	ON-OFF	Provides power ON-OFF control and circuit breaker protection.
DS4	Green LED		Lights when dc power is applied to unit.
Channel Selector Switches			
S1	7-Position Rotary Switch	1 through 7	Selects one of seven basic RF channels.
S2	3-Position Rotary Switch	−,0, +	Provides a plus or minus 4.25 MHz offset to basic channel selected by S1 for 21 channel operation.
S3	RF Power Range Selector Switch	RF PWR. HI. LO	Selects HI (12W) RF power output for maximum range or LO (1W) RF power output for short hops.
S5 (S4)	Audio Input Selector Switches	AUDIO 1 (2), MIC. LINE	Selects −50 dBm, 200 ohm microphone input or 0 dBm, 600 ohm balanced line input for AUDIO 1 (2).
DS1 (DS2)	Red LED's	AUDIO 1 (2) PEAK	Peaking indicators for AUDIO 1 (2) inputs.
DS3	Yellow LED	RF ON	Lights when Transmitter RF circuits are energized. Allow approximately 10 seconds for synthesizer to lock on frequency.


PEAK 1
AUDIO
2 PEAK
MIC
LI
0
–
+
3
4
5
2
6
1
7
RF PWR
RF ON
VIDEO IN
HI
LO
Microwave
Associates
Communications
A COM COMPANY

INITIAL TURN-ON PROCEDURE

The following is the procedure for initial turn-on of the Mini-MAC™ Transmitter. It will be assumed that the antennas are aligned and the other end of the hop is operational.

Step 1. Verify that primary power is available and of current polarity at the interface.

Step 2. Select MIC or LINE inputs for Audio 1 and 2 as applicable.

Step 3. Use the front panel channel selector switches to select the desired frequency (Table 3-2), Note that the center (zero) position of the offset switch is for basic seven channel operation.

Step 4. Switch on the circuit breaker and make certain that the green indicator on the front panel lights up. Observe that the RF ON (yellow) indicator lights approximately 10 seconds after turn-on.

NOTE

When changing channels, RF ON indicator will re-illuminate only after synthesizer reacquires lock (aproximately 2 seconds).

Table 3-2. Channel Frequencies

S1–CHANNEL SWITCH POSITION	S2–OFFSET SWITCH POSITION		
	– OFFSET (MHz)	0 CENTER (MHz)	+ OFFSET (MHz)
1	1994.75	1999.00	2003.25
2	2012.25	2016.50	2020.75
3	2029.25	2033.50	2037.75
4	2046.25	2050.50	2054.75
5	2063.25	2067.50	2071.75
6	2080.25	2084.50	2088.75
7	2097.25	2101.50	2105.75

WARNING

*PERSONNEL WEARING PACEMAKERS **SHOULD NOT** OPERATE THIS EQUIPMENT.*

OBSERVE PROPER PRECAUTIONARY MEASURES TO AVOID POSSIBLE EXPOSURE OF PERSONNEL TO RADIATED MICROWAVE ENERGY LEVELS EXCEEDING ACCEPTABLE, SAFE LIMITS.

THE FOLLOWING FACTORS MUST BE CONSIDERED BY ENG CREW PERSONNEL DURING OPERATION OF MICROWAVE EQUIPMENT:

- *TRANSMITTER POWER OUTPUT*
- *ANTENNA RADIATION PATTERN*
- *SECURE MICROWAVE EQUIPMENT MOUNTING*

CAUTION

Before operation of the equipment, the RF output should be properly terminated to the antenna or other suitable load.

MAXIMUX TEST DATA

CUSTOMER: WFRV-TV

JOB Number: 2P8C-400

Tx Serial No.: M350C

DATE: 6/28/82

Number of Channel (s): 21

CH. NO.	POWER Hi / Low	FREQ.
1.	11.5 / 3.4 w.	1.999 GHZ
2.	11.5 / 3.4 w.	2.0165 GHZ
3.	11.5 / 3.2 w.	2.0335 GHZ
4.	11.5 / 3.0 w.	2.0505 GHZ
5.	11.0 / 2.9 w.	2.0675 GHZ
6.	10.5 / 2.6 w.	2.0845 GHZ
7.	10.0 / 2.3 w.	2.1015 GHZ

AUDIO SUBCARRIER FREQ. #1 4.83

#2 6.2

TEST TECH: Wesley Reece

System ENG: _____

CUSTOMER: WFRU-TV

JOB # : 2P8C-400

DATE: 6/28/82

1. Baseband Response CRCL= -40dBm
   Spec: ± 0.5 DB total

10 kHz	0 db	
60 kHz	0 db	
300 kHz	0 db	
1.0 MHz	0 db	
2.0 MHz	-.10 db	
3.58 MHz	-.25 db	
4.5 MHz	-.35 db	

AUDIO SIG/NOISE

"Line" Input Spec: 65DB m.

1 74 2 66

"Mic" Input Spec: 63 DB m.

1 71 2 65

2. Differential Phase

-50% Apl @ 3.58 MHz	.1 °	0.3° max.
10-90% Apl @ 3.58 MHz	.1 °	0.3° max.

3. Differential Gain

-50% Apl @ 3.58 MHz	.10 db	0.2 dB (2%) max.
10-90% Apl @ 3.58 MHz	.10 db	

4. Signal-to-hum	>60 db	Spec: 60DB min.
5. Square Wave Tilt	.08 db	Spec: 2 IRE max.
6. Spurious Signals in the BB	>65 db	Spec: 65 DB min.
7. Transient Response (2T pluse)	.08 db	2% max.
8. Video Signal-to-Noise	>65 db	Spec: 65DB min.

Measured For CCIR.

System Test: Warren Reece

System Engr: