

TECHNICAL MANUAL



HARRIS

HARRIS CORPORATION Broadcast Group
P.O. Box 4290 Quincy, Illinois 62305-4290

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HARRIS HT 1FM TRANSMITTER

FINAL TEST DATA

DATE: 28 Sep 1990

TIME: 06:54:50

Customer Name: KSJG
Address: MORGAN HILL CA

Frequency(MHZ): 96.1 TPO(WATTS): 750
AC Power Set For: 240 VAC 60 HERTZ
F.O.#: F950240001
Transmitter S/N: MFG66388890001
Exciter S/N: MPS10370300002 Exciter RF Amp S/N: 750
PA1 S/N: MFG10805590002 PA1 RF Amp S/N: 2923
PA2 S/N: MFG10805590001 PA2 RF Amp S/N: 2926
RF Impedance: 50 ohms AUDIO Impedance: 2K/600 ohms

Comments: COAX 18 38 INCHES

RELEASED FOR SHIPMENT

Test Tech: Richard C Lee Date: 9/28/90
Manufacturing: L. Williams Date: 9/28/90
P. O. Grant 9/28/90

PROOF OF PERFORMANCE

I. EXCITER OPERATIONAL FUNCTION CHECKS:

- | | | | |
|---------------------|----|---------------------|----|
| 1. INDICATORS: | OK | 5. REMOTE CONTROLS: | OK |
| 2. LOCAL METERING: | OK | 6. VSWR SHUTDOWN: | OK |
| 3. REMOTE METERING: | OK | 7. 'LOCK-UP' TIME: | OK |
| 4. LOCAL CONTROLS: | OK | 8. AGC: | OK |

II. EXCITER MULTIMETER READINGS:

- | | | | |
|----------------------|-----------|----------------------|----------|
| 1. AFC VOLTAGE: | 6.9 VDC | 3. PA CURRENT (PAI): | 4.4 AMPS |
| 2. PA VOLTAGE (PAE): | 15.0 VDC | 4. REFLECTED POWER: | .2 WATT |
| 5. FORWARD POWER: | 35.5 WATT | | |

III. CONTROLLER FUNCTION CHECKS:

- | | | | |
|---------------------|----|---------------------|----|
| 1. INDICATORS: | OK | 5. REMOTE CONTROLS: | OK |
| 2. LOCAL METERING: | OK | 6. VSWR SHUTDOWN: | OK |
| 3. REMOTE METERING: | OK | 7. REJECT LOAD: | OK |
| 4. LOCAL CONTROLS: | OK | 8. EXT INTRLK: | OK |

IV. CONTROLLER MULTIMETER READINGS:

- | | | | |
|----------------------|----------|----------------------|-----------|
| 1. PA VOLTAGE (PAE): | 50.0 VDC | 3. PA CURRENT (PAI): | 27.8 AMPS |
| 2. FWD PWR: | 100.0 % | 4. VSWR: | 1.0 |
| 5. AFC: | 92.0 % | 6. BAT TEST: | OK |

V. POWER AMPLIFIER PARAMETERS MEASURED AT TEST POINTS:

1. POWER AMPLIFIER 1 (TOP):
 - a. Voltage test point: 50 VDC
 - b. Current test point: 1.55 VDC = X10 =15.5 AMPS
2. POWER AMPLIFIER 2 (BOTTOM):
 - a. Voltage test point: 50 VDC
 - b. Current test point: 1.26 VDC = X10 =12.6 AMPS

VI. PERFORMANCE DATA:

1. CARRIER FREQUENCY: 96.100000 MHZ
2. RF POWER OUTPUT: 753 WATTS
3. POWER AMPLIFIER EFFICIENCY @ 753 WATTS: 54 %
4. RF SAMPLE OUTPUT: -31 dBc
5. COMPOSITE INPUT LEVEL TO OBTAIN 75 KHZ DEVIATION: .999 VRMS.
6. BALANCED COMPOSITE TEST DATA

FREQ (HZ)	RESP (dB)	DIST (%)
1000	0.00	.0353
30	.04	.0353
60	.01	.0355
100	0.00	.0358
200	.01	.0356
400	.01	.0354
800	0.00	.0359
2000	.01	.0356
4000	0.00	.0356
8000	.01	.0347
16000	.01	.0361
32000	0.00	
64000	-.04	
100000	-.08	

IM DISTORTION: .0123 %
 FM NOISE: -83.80 dB
 AM ASYNCHRONOUS NOISE: -74.20 dB
 AM SYNCHRONOUS NOISE: -66.10 dB

7. MONO TEST DATA WITH PRE-EMPHASIS SET FOR: 75US
 AUDIO INPUT LEVEL TO OBTAIN 75 KHZ DEVIATION: 10.11 dBm

FREQ (HZ)	RESP (dB)	DIST (%)
100	-.01	.0450
30	-.01	.0460
60	0.00	.0480
200	-.04	.0460
400	-.03	.0460
800	.01	.0460
2000	.01	.0480
4000	.04	.0490
8000	.03	.0530
15000	.04	.0620

IM DISTORTION: .0239 %
 FM NOISE: -85.40 dB

8. SPURIOUS HARMONICS ABOVE -85 dBc: NONE

TECHNICAL MANUAL

HT 250FM - 994 9233 002

HT 500FM - 994 9195 002

HT 1FM - 994 9231 002



HARRIS

24 hour Parts - 800 422-2218

Regular Business # 217 222-8200

T.M. No. 888-2312-002

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MANUAL REVISION HISTORY PAGE

HT250/500/1FM

988-2312-001

REV. #	DATE	ECN #	Pages Affected
002	02/05/90	PCN DP-37	Replaced the following pages: Title Page, iv, 5-4, & all of Section VI. Added Manual Revision History Page (MRH-1/MRH-2)

WARNING

THE CURRENTS AND VOLTAGES IN THIS EQUIPMENT ARE DANGEROUS. PERSONNEL MUST AT ALL TIMES OBSERVE SAFETY WARNINGS, INSTRUCTIONS AND REGULATIONS.

This manual is intended as a general guide for trained and qualified personnel who are aware of the dangers inherent in handling potentially hazardous electrical/electronic circuits. It is not intended to contain a complete statement of all safety precautions which should be observed by personnel in using this or other electronic equipment.

The installation, operation, maintenance and service of this equipment involves risks both to personnel and equipment, and must be performed only by qualified personnel exercising due care. HARRIS CORPORATION shall not be responsible for injury or damage resulting from improper procedures or from the use of improperly trained or inexperienced personnel performing such tasks.

During installation and operation of this equipment, local building codes and fire protection standards must be observed. The following National Fire Protection Association (NFPA) standards are recommended as references:

Automatic Fire Detectors, No. 72E

Installation, Maintenance, and Use of Portable Fire Extinguishers, No. 10

Halogenated Fire Extinguishing Agent Systems, No. 12A

WARNING

ALWAYS DISCONNECT POWER BEFORE OPENING COVERS, DOORS, ENCLOSURES, GATES, PANELS OR SHIELDS. ALWAYS USE GROUNDING STICKS AND SHORT OUT HIGH VOLTAGE POINTS BEFORE SERVICING. NEVER MAKE INTERNAL ADJUSTMENTS, PERFORM MAINTENANCE OR SERVICE WHEN ALONE OR WHEN FATIGUED.

Do not remove, short-circuit or tamper with interlock switches on access covers, doors, enclosures, gates, panels or shields. Keep away from live circuits, know your equipment and don't take chances.

WARNING

IN CASE OF EMERGENCY ENSURE THAT POWER HAS BEEN DISCONNECTED.

WARNING

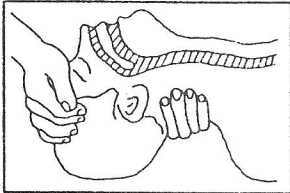
IF OIL FILLED OR ELECTROLYTIC CAPACITORS ARE UTILIZED IN YOUR EQUIPMENT, AND IF A LEAK OR BULGE IS APPARENT ON THE CAPACITOR CASE WHEN THE UNIT IS OPENED FOR SERVICE OR MAINTENANCE, ALLOW THE UNIT TO COOL DOWN BEFORE ATTEMPTING TO REMOVE THE DEFECTIVE CAPACITOR. DO NOT ATTEMPT TO SERVICE A DEFECTIVE CAPACITOR WHILE IT IS HOT DUE TO THE POSSIBILITY OF A CASE RUPTURE AND SUBSEQUENT INJURY.

TREATMENT OF ELECTRICAL SHOCK

1. IF VICTIM IS NOT RESPONSIVE FOLLOW THE A-B-Cs OF BASIC LIFE SUPPORT.
PLACE VICTIM FLAT ON HIS BACK ON A HARD SURFACE

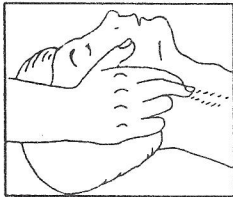
A AIRWAY

IF UNCONSCIOUS,
OPEN AIRWAY



LIFT UP NECK
 PUSH FOREHEAD BACK
 CLEAR OUT MOUTH IF
 NECESSARY
 OBSERVE FOR BREATHING

CHECK
 CAROTID PULSE



IF PULSE ABSENT,
 BEGIN ARTIFICIAL
 CIRCULATION

B BREATHING

IF NOT BREATHING,
 BEGIN ARTIFICIAL BREATHING

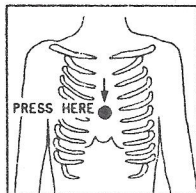


TILT HEAD
 PINCH NOSTRILS
 MAKE AIRTIGHT SEAL

4 QUICK FULL BREATHS
 REMEMBER MOUTH TO
 MOUTH RESUSCITATION
 MUST BE COMMENCED AS
 SOON AS POSSIBLE

C CIRCULATION

DEPRESS STERNUM 1 1/2
 TO 2 INCHES

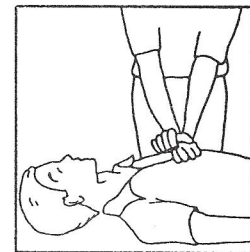


APPROX. RATE
 OF COMPRESSIONS
 --80 PER MINUTE

APPROX. RATE
 OF COMPRESSIONS
 ---60 PER MINUTE

ONE RESCUER
 15 COMPRESSIONS
 2 QUICK BREATHS

TWO RESCUERS
 5 COMPRESSIONS
 1 BREATH



NOTE: DO NOT INTERRUPT RHYTHM OF COMPRESSIONS WHEN SECOND PERSON IS GIVING BREATH

CALL FOR MEDICAL ASSISTANCE AS SOON AS POSSIBLE

2. IF VICTIM IS RESPONSIVE.

- A. KEEP THEM WARM
- B. KEEP THEM AS QUIET AS POSSIBLE
- C. LOOSEN THEIR CLOTHING
- D. A RECLINING POSITION IS RECOMMENDED

FIRST-AID

Personnel engaged in the installation, operation, maintenance or servicing of this equipment are urged to become familiar with first-aid theory and practices. The following information is not intended to be complete first-aid procedures, it is a brief and is only to be used as a reference. It is the duty of all personnel using the equipment to be prepared to give adequate Emergency First Aid and thereby prevent avoidable loss of life.

Treatment of Electrical Burns

1. Extensive burned and broken skin
 - a. Cover area with clean sheet or cloth. (Cleanest available cloth article.)
 - b. Do not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.
 - c. Treat victim for shock as required.
 - d. Arrange transportation to a hospital as quickly as possible.
 - e. If arms or legs are affected keep them elevated.

NOTE

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot or cold). Allow victim to sip slowly about 4 ounces (a half of glass) over a period of 15 minutes. Discontinue fluid if vomiting occurs. (Do not give alcohol.)

2. Less severe burns - (1st & 2nd degree)
 - a. Apply cool (not ice cold) compresses using the cleanest available cloth article.
 - b. Do not break blisters, remove tissue, remove adhered particles of clothing, or apply salve or ointment.
 - c. Apply clean dry dressing if necessary.
 - d. Treat victim for shock as required.
 - e. Arrange transportation to a hospital as quickly as possible.
 - f. If arms or legs are affected keep them elevated.

REFERENCE:

ILLINOIS HEART ASSOCIATION

AMERICAN RED CROSS STANDARD FIRST AID AND PERSONAL SAFETY MANUAL (SECOND EDITION)

888-2312-001

WARNING: Disconnect primary power prior to servicing.

iii

Table of Contents

SECTION I		Output Directional Coupler	4-1
DESCRIPTION		Controller	4-1
Introduction	1-1	Power Supply	4-1
Equipment Purpose	1-1	Operating Circuits	4-4
Physical Description	1-1	Metering Circuits	4-4
Functional Description	1-1	Overload and Alarm Circuits	4-4
FM Exciter	1-1	Power Control Circuits	4-4
RF Circuits	1-1	User Interface RFI Filter and Transient Protection ..	4-6
Splitter (HT 1FM ONLY)	1-1	AC Power Distribution	4-6
500 Watt Power Amplifier	1-1		
250 Watt Power Amplifier	1-1	SECTION V	
Lowpass Filter	1-1	MAINTENANCE	
Directional Coupler	1-1	Introduction	5-1
Controller	1-1	Purpose	5-1
Multimeter	1-1	Station Records	5-1
Controller Functions	1-3	Transmitter Logbook	5-1
Indicators	1-3	Maintenance Logbook	5-1
Remote Control	1-4	Safety Precautions	5-1
Remote Control Commands	1-4	Preventive Maintenance	5-1
Remote Control Metering Samples	1-4	Filter Cleaning	5-1
Remote Status Indicators	1-4	Blower Maintenance	5-1
Equipment Characteristics	1-4	Maintenance Of Components	5-1
		Semiconductors	5-1
SECTION II		Capacitors	5-2
INSTALLATION		Fixed Resistors	5-2
Introduction	2-1	Transformers	5-2
Unpacking	2-1	Meters	5-2
Returns and Exchanges	2-1	Relays	5-2
Installation	2-1	Switches	5-2
Cooling Air Requirements	2-1	Corrective Maintenance	5-2
Transmitter Placement	2-1	Troubleshooting	5-2
Component Installation	2-1	Technical Assistance	5-2
Reassembly Instructions	2-1	Alignment Procedures	5-2
Initial Checkout	2-2	Voltmeter and Ammeter Calibration	5-3
Connections to Remote Controls	2-2	500 Watt PA Chassis, 250 Watt PA Chassis ...	5-3
External Fail-Safe Interlock Connections	2-2	Voltmeter Calibration	5-3
EBS Connections	2-2	Ammeter Calibration	5-3
		Controller Calibration Alarm and Fault Settings ...	5-3
SECTION III		Manual Power Control Limit Setting	5-3
OPERATION		Automatic Power Control (APC) Limit Setting	5-3
Introduction	3-1	Forward Power Meter Calibration	5-3
Controls and Indicators	3-1	SWR Meter Calibration	5-3
Preoperational Checks	3-6	SWR Foldback Trip Point Setting	5-3
Transmitter Turn On and Checkout	3-6	Reject Load - Balance Detector Fault Calibra-	
Power Raise & Lower	3-6	tion	5-4
Transmitter Shutdown	3-6	Setting Foldback Power Level	5-4
PA Bypass Procedure	3-6	Low Power Trip Set	5-4
Single PA Bypass Procedure - (HT 1FM)	3-6	Procedure for Removing an RF Power Transistor from	
PA Bypass Procedure — HT 500 and 250FM	3-6	a PA Module	5-4
Overload Set Procedure	3-6	Procedure to Mount New Transistor to PA Module ...	5-4
SECTION IV		SECTION VI	
PRINCIPLES OF OPERATION		PARTS LIST	
Introduction	4-1	Introduction	6-1
FM Exciter	4-1	Replaceable Parts Service	6-1
500 Watt Power Amplifier (PA)	4-1		
250 Watt Power Amplifier (HT 250FM only)	4-1	SECTION VII	
Power Combiner (HT 1FM ONLY)	4-1	DIAGRAMS	
Output Lowpass Filter	4-1	Introduction	7-1

SECTION I DESCRIPTION

1.1. Introduction

This Technical Manual provides information necessary to install, operate, maintain, and service the HT 250FM, HT 500FM, or HT 1FM BROADCAST TRANSMITTERS.

Sections in this Technical Manual contain the following information:

SECTION I, GENERAL DESCRIPTION, provides a description of equipment features, identifies major components and lists operating parameters and specifications.

SECTION II, INSTALLATION, provides unpacking, inspection and installation information, preoperational checks, and power-on checks to ensure correct operation.

SECTION III, OPERATION, identifies controls and indicators and provides equipment and operational procedures.

SECTION IV, PRINCIPLES OF OPERATION, provides a functional description and detailed diagrams with theory of operation.

SECTION V, MAINTENANCE, provides preventive and corrective maintenance information and troubleshooting with instructions for equipment servicing.

SECTION VI, PARTS LIST, provides information for ordering replacement components and assemblies.

SECTION VII, DIAGRAMS, provides block, logic, schematic diagrams, and other drawings required for operation and maintenance.

1.2. Equipment Purpose

The HT 1FM FM BROADCAST TRANSMITTER (refer to Figure 1-1) is a 1000-watt FM Transmitter (HT 250FM is a 250-watt FM Transmitter and HT 500FM is a 500-watt FM Transmitter) designed for continuous broadcast operation in the 87.5 to 108 MHz Commercial FM Broadcast Band.

1.3. Physical Description

The entire unit, including the FM Exciter, IPA, PA, associated power supplies, metering, and control circuitry is contained in one cabinet. All required metering is provided by a meter located on the front panel of the transmitter controller plus two meters located on the front face of the FM Exciter.

Circuit breakers are accessible on the front panel of the individual transmitter sub-assemblies.

1.4. Functional Description

Refer to Figure 1-2 for a block diagram of the system.

1.4.1. FM Exciter

The FM Exciter produces a frequency modulated output continuously variable from 3 to 55 watts into a 50-ohm load for any channel assignment within the 87.5 to 108 MHz Commercial FM Broadcast Band. Servicing is simplified as the FM Exciter is modular in concept. The metering panel contains a true peak-reading audio meter with a times 10 expansion range and a multimeter which monitors important rf and control voltages. Light emitting diode (LED) status indicators monitor critical functions on the exciter. The exciter accepts wideband composite stereo/mono inputs and has separate inputs for up to two SCA generators.

1.4.2. RF Circuits

The entire rf chain in the FM Transmitter utilizes 50-ohm interfaces as follows:

- a. 50 ohms Exciter to Splitter.
- b. 50 ohms splitter to 500W PA.
- c. 50 ohms 500W PA to Combiner.
- d. 50 ohms Combiner to Antenna Load.

The convenience of 50-ohm interface allows patching around any stage during an emergency fault condition. For example, should the final PA stage fail, the FM Exciter can be patched directly into the antenna, resulting in good local coverage. All that is required is the disconnection of the input line from the PA and the reconnection to the input of the Lowpass Filter.

1.4.3. Splitter (HT 1FM ONLY)

The output of the Exciter is routed through a two way power Splitter on the rear panel of the Controller. This provides equal rf drive for the two 500W PAs.

1.4.4. 500 Watt Power Amplifier

The final amplifier stage is a conservatively rated 500 Watt amplifier consisting of eight power MOSFET transistors operating in two push-pull parallel pairs. The amplifier incorporates a controller which protects itself from operational faults and abuse. Sensors detect over temperature, high VSWR, overdrive and over voltage conditions and disable the module until the condition is corrected. The internal power supply provides a regulated 50 VDC at up to 25 A.

1.4.5. 250 Watt Power Amplifier

The 250 Watt Power Amplifier is identical to the 500 Watt PA but uses half the number of transistors in the amplifier module. All other circuitry is the same.

1.4.6. Lowpass Filter

The FM Transmitter incorporates a fixed tuned multi-element lowpass filter to prevent the emission of harmonic and spurious energy. This filter covers the entire FM band and requires no field or factory tuning for any operating frequency, 87.5 to 108 MHz.

1.4.7. Directional Coupler

A dual element Directional coupler is used for monitoring of forward and reverse power and to provide inputs for the automatic power control and VSWR foldback circuitry.

1.4.8. Controller

The Controller provides the following functions:

- a. Transmitter On/Off.
- b. Raise/Lower Power.
- c. Automatic VSWR Foldback.
- d. Automatic Power Control.
- e. AC Restart.
- f. Remote Control Interface.
- g. Overload Detection, Protection, and Display.

1.4.9. Multimeter

Metering of the essential operating parameters of the FM Transmitter is accomplished with a multimeter located on the CONTROLLER front panel. A pushbutton selector switch, mounted next to the Multimeter selects the following:

- a. PA E (PA Drain voltage) 0-60 volts
- b. PA I (PA Drain current) 0-30 A, 0-60 A for HT 1FM
- c. FWD PWR (Forward Power) 0-125% of TPO Watts
- d. SWR to 2.2:1
- e. APC voltage 0-125%
- f. BAT TEST 0-30V

The PA Voltage reading is the drain voltage on the final amplifier. In the case of the HT 1FM, the average voltage of the two amplifiers is displayed.

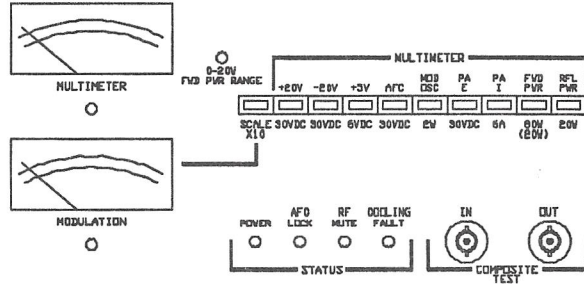
The PA Current reading is the drain current of the final amplifier. In the case of the HT 1FM, the sum of the currents for both amplifiers is displayed.

FORWARD Power is a true indication of power being supplied to the antenna system. The Output Power sample is taken from the Directional Coupler which is the

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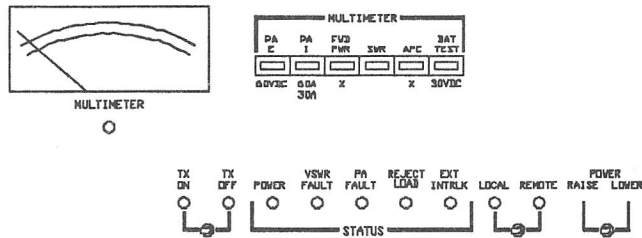
HT 1FM

THE-1 FM EXCITER



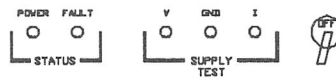
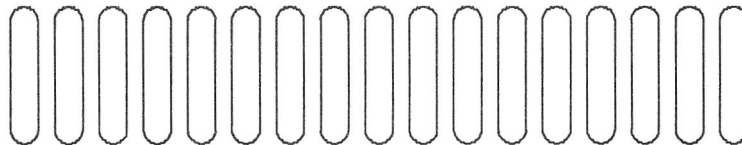
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CONTROLLER



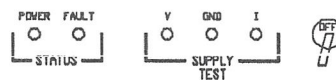
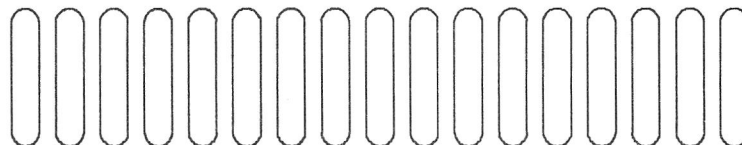
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POWER AMPLIFIER



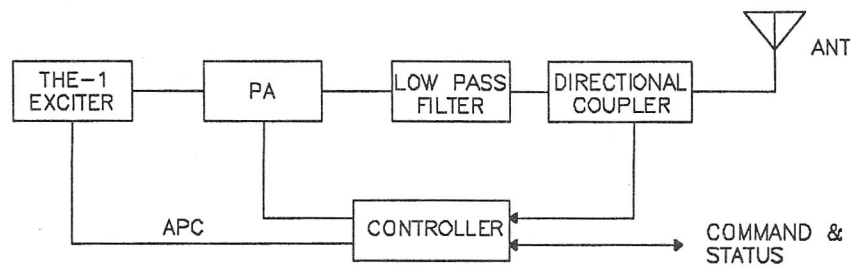
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POWER AMPLIFIER



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Figure 1-1. HT 1FM Front View

HT 250FM
HT 500FM

HT 1FM ONLY

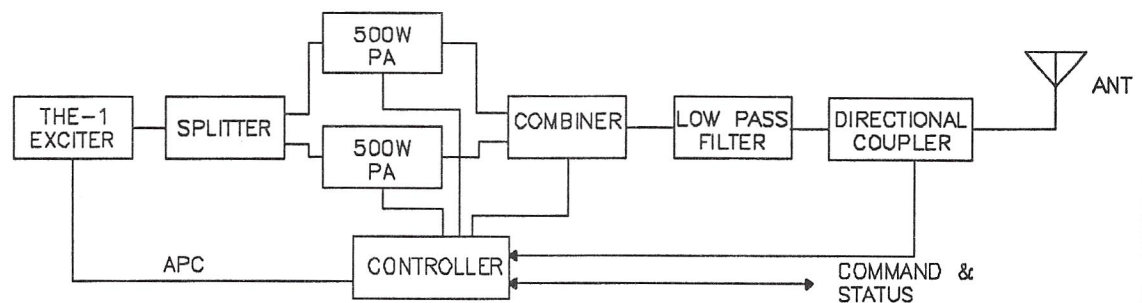


Figure 1-2. HT 250/500/1FM Block Diagrams

connection to the antenna and located at the output of the lowpass filter.

SWR is a ratio reading (example 1.15:1) on the POWER meter.

APC voltage is a relative indication of the functioning of the automatic power control and VSWR foldback loop. It is provided to facilitate setup of the transmitter APC loop.

BATT TEST: Checks voltage of the optional 9-Volt Controller battery which is used for long term retention of the control settings. A push-to-test pushbutton switch eliminates the possibility of leaving the MULTIMETER in this test position and draining the battery.

NOTE

The control settings (TX ON-TX OFF state and power level setting) are backed up for at least five hours during power outages by a capacitive storage device. If longer outages are anticipated, a battery may be installed.

NOTE

The 9-Volt battery used is a common variety transistor radio battery (DO NOT USE ALKALINE BATTERY). In normal operation, the battery has no drain on it

nor does it receive a charge. Depending on the freshness of the battery at the time of installation, typical life is expected to be a year plus. The battery, if called upon, should provide at least 30 days of control setting retention.

PA voltage, PA current, forward power, and VSWR readings are all available for remote control monitoring. These readings are all positive when referenced to ground.

1.4.10. Controller Functions

The Controller Panel has the following control functions:

TX ON/TX OFF - Selects transmitter ON or OFF

LOCAL/REMOTE - Selects either local or remote command of the transmitter. A red LED is illuminated with the switch in the LOCAL Mode reminding the operator to switch to remote control before leaving the remote site.

RAISE/LOWER - Raises and lowers the transmitter output power.

1.4.11. Indicators

POWER. Indicates AC power is applied to the Controller

chassis.

VSWR FAULT. Indicates the initiation of VSWR foldback as set by the threshold control in the Controller. This fault will automatically clear when the VSWR condition is removed.

PA FAULT. Initiates a power turndown as set by the foldback setting in the controller. The PA FAULT occurs when either one of the amplifier module protection levels has been exceeded, or when the a voltage regulator heatsink has exceeded 85°C. The amplifier protection levels are 3:1 VSWR, 82°C heatsink temperature, collector voltage >54V, and drive >70W. The fault protection will automatically clear when the fault condition is cleared.

BALANCE FAULT. Shuts down the transmitter when the voltage across the reject load in the combiner exceeds the Balance threshold. The fault latch is automatically cleared when the TX ON command is given.

EXT INTRLK (External or Failsafe Interlock). Provides an interlock circuit with external pieces of equipment such as water-cooled dummy

loads, air-handling systems, combining equipment, etc. When this external contact is opened, the transmitter will shut down or will be prevented from coming up and when this occurs the EXT INTRLK LED will illuminate. After the external interlock closes, the transmitter will come back up or may be turned on and the EXT LED will be extinguished. There is no memory to this indicator. This external interlock command interrupts the ac line contactor supply.

NOTE

The external failsafe interlock is a series loop circuit. The external interlock must provide a contact closure between terminals 1 and 2 on terminal board TB1 on the rear panel of the Controller chassis.

Automatic VSWR Foldback. The Controller constantly monitors the reflected power sample from the transmitter Directional Coupler. If the reflective sample exceeds the threshold (adjustable), the Controller automatically lowers the EXCITER drive which lowers forward output power and the relative amount of reflective power detected by the Directional Coupler. The Controller continues lowering output power until the reflective voltage sample is below the safe threshold level. The Controller constantly monitors the reflective voltage level. When an antenna icing condition begins to clear, and the load begins to return to normal, the Controller automatically increases power to the safest level. The automatic VSWR foldback circuit does not lower the antenna system SWR, that ratio remains constant. The circuit merely lowers forward power which in turn simulta-

neously lowers reflective power to a safe system operating level, thus keeping the station on the air. This function is active regardless of the selection of APC ON or OFF.

Automatic Power Control. The Automatic Power Control circuit is similar to the automatic VSWR foldback circuit. After the transmitter has been adjusted for desired output power, the automatic power control automatically maintains power to within +/-5%. The Automatic Power Control may be enabled or disabled by a switch in the top cover of the Controller. For example, should a front panel or remote raise or lower command be given, the transmitter power will raise or lower. The Automatic Power Control is only overridden by input from the automatic VSWR foldback circuit which will lower and maintain power at a safe operating level under high-load VSWR conditions.

AC Restart. AC Restart automatically returns the transmitter to its previous state (either ON, or OFF) after an AC Power failure. Except for the lock-up time of the AFC loop in the Exciter, there is no warmup delay at TX ON.

1.4.12. Remote Control

All connections are made on a large, easily accessible terminal strip located on the rear of the Controller chassis. The following control functions, meter samples, and status indicators are all available for remote control and indication. These commands all require a momentary contact closure be-

tween the desired command line and Common (Chassis):

1.4.12.1. Remote Control Commands

1. TX ON
2. TX OFF
3. POWER RAISE
4. POWER LOWER
5. EBS Keying

1.4.12.2. Remote Control Metering Samples

1. PA Voltage
2. PA Current
3. Forward Power
4. Reflective Power

1.4.12.3. Remote Status Indicators

1. External Interlock Fault
2. Output Power Fault (Output power less than threshold setting)
3. SWR FOLDBACK
4. BALANCE FAULT
5. VSWR (ANTENNA)

When activated, these status outputs go "low." Remote metering is typically a positive voltage. All remote indicators and controls are "open collector, common ground" compatible.

1.5. Equipment Characteristics

Table 1-1 lists the electrical operating characteristics and parameters for the FM Transmitter as well as the mechanical characteristics.

NOTE

Specifications subject to change without notice.

Table 1-1. Electrical and Mechanical Characteristics

GENERAL	
POWER OUTPUT RANGE	
HT 250FM	55 to 265 watts
HT 500FM	235 to 525 watts
HT 1FM	300 to 1050 watts
FREQUENCY RANGE	87.5 to 108 MHz in 50 kHz steps
EXCITATION	Harris THE-1 High Power FM Exciter or equivalent
TYPE OF MODULATION	Direct carrier frequency modulation (DCFM)
MODULATION CAPABILITY	+/-200 kHz
LOAD IMPEDANCE	50 ohms
OUTPUT TERMINATION	N female (HT 1FM: 7/8" EIA flange, female)
MAXIMUM LOAD VSWR	1.5:1 VSWR, maximum for full output power; automatic power reduction into high VSWR's.
RF HARMONIC/SPURIOUS OUTPUT	Suppression meets or exceeds FCC/DOC/CCIR specifications
AC INPUT POWER	197-250 Vac, 50 or 60 Hz, single phase, 2-wire
POWER CONSUMPTION	
HT 250FM	500 watts
HT 500FM	1000 watts
HT 1FM	2000 watts
AMBIENT TEMPERATURE RANGE	0 to +45°C at sea level; derated 2°C/1000 ft altitude
MAXIMUM ALTITUDE	10,000 ft (50 or 60 Hz)
MAXIMUM HUMIDITY	To 95% non-condensing
CABINET SIZE	22-1/8"W (56.2 cm) x 25-1/2"D (64.8 cm) x 72"W (182.9 cm)
WEIGHT	
HT 250FM	185 lbs
HT 500FM	275 lbs
HT 1FM	400 lbs

SECTION II INSTALLATION

2.1. Introduction

This section contains information for the installation of the low power HT line of FM BROADCAST TRANSMITTERS and for performing the preoperational checks. Generally, the individual chassis assemblies are individually packed for shipment and must be installed in the appropriate rack shelf. These components will be identified with appropriate instructions for reinstallation and wiring.

2.1.1. Unpacking

Carefully unpack the FM Transmitter and perform a visual inspection to determine that no apparent damage was incurred during shipment. Retain the shipping materials until it has been determined that the unit is not damaged. The contents of the shipment should be as indicated on the packing list. If the contents are incomplete or if the unit is damaged electrically or mechanically, notify the carrier and HARRIS CORPORATION, Broadcast Division.

2.1.2. Returns and Exchanges

Damaged or undamaged equipment should not be returned unless written approval and a Return Authorization is received from HARRIS CORPORATION, Broadcast Division. Special shipping instructions and coding will be provided to assure proper handling. Complete details regarding circumstances and reasons for return are to be included in the request for return. Custom equipment or special order equipment is not returnable. In those instances where return or exchange of equipment is at the request of the customer, or convenience of the customer, a restocking fee will be charged. All returns will be sent freight prepaid and properly insured by the customer. When communicating with HARRIS CORPORATION, Broadcast Division, specify the HARRIS Order Number or Invoice Number.

2.2. Installation

Prior to installation, this Technical Manual and the FM Exciter Technical Manual should be carefully studied to obtain a thorough understanding of the principles of operation, circuitry and nomenclature. This will facilitate proper installation and initial checkout. The FM Transmitter installation is accomplished in four steps: (1) transmitter placement, (2) component installation, (3) transmitter wiring, and (4) initial checkout.

2.2.1. Cooling Air Requirements

Harris transmitters are always designed to operate in a free, unobstructed environment with a maximum inlet air temperature of 50°C. This means that the transmitter air system is designed to supply sufficient air at the required static pressure to cool the transmitter only. Any additional pressure losses introduced by air exhaust systems & air supply systems must be satisfied by means other than the transmitter blowers. These inlet & exhaust systems generally need to be fan driven.

2.2.2. Transmitter Placement

Set the transmitter in place on a level surface near power and signal cables. Either side of the FM Transmitter may be placed against a wall or other equipment. Complete access is through the front and rear of the transmitter.

The floor must be capable of supporting a load of 120 pounds per-square-foot (58.6 kg per-square-meter) (refer to applicable cabinet outline drawing listed in Section 7).

2.2.3. Component Installation

The removal of components varies due to the method of shipment. All removed items will be tagged to aid reinstallation in the transmitter. Arrange these components in separate groups according to the section from which they were removed. Items such as interconnecting wires and cables and miscellaneous small parts may be taped or tied in for shipment. Remove all tape, string, and packing material that has been used for this purpose. Symbol numbers and descriptions are provided on each removed component corresponding to the schematic diagram, parts list, and packing list. Symbol numbers are also stenciled in the cabinet of each removed item. Terminals and wires are tagged with information telling how to reconnect each item. Mounting hardware should be found either in small bags attached to each removed component or inserted in the tapped holes where each component mounts. Reinstall each component in its proper location.

2.2.3.1. Reassembly Instructions

Depending on the particular model and the method of shipment, it may be necessary to reassemble the Transmitter. Each of the separate chassis assemblies fits onto a shelf which is then fitted into a cabinet rack. On some models, the Transmitter can be purchased for installation into an existing rack.

In any case, it is important to stack the individual component chassis in the proper order to obtain optimum performance. The exciter, THE-1, is on top and the Controller next. The Power Amplifiers are lowest. This configuration assures minimum interaction between units, and maintains a low center of gravity.

If the Transmitter has been shipped in the rack, it will be necessary to remove the shipping hardware on the Power Amplifier(s). To prevent movement during shipping, two screws are used to secure the rear end of the chassis to the mounting shelf. These must be removed, starting with the lower chassis. There are no rear screws on the Controller or Exciter.

The ac input for the transmitter should come from low impedance, 50/60 Hz, single phase supply with sufficient capacity to supply the transmitter. A terminal board is located inside the AC distribution assembly for ac power connections. The list that follows gives the circuit breaker or fuse and disconnect recommended for the low power HT transmitter line.

Transmitter Type	Circuit Breaker or Fuse & Disconnect
HT 250FM	10 amp
HT 500FM	15 amp
HT 1FM	30 25 amp

The ac input wiring should be in agreement with local electrical codes and capable of supplying the transmitter power requirements. An ac primary power disconnect or means to completely deenergize the transmitter primary circuit for servicing is necessary. If the program leads must be routed in close proximity to the ac power input wiring, the program leads should be separately shielded.

A good ground at FM frequencies is mandatory to keep stray rf currents to a minimum. RF interference usually shows up in one of two ways, feedback or high noise (in some cases both). Even a small amount of non-shielded wire makes a very efficient antenna for FM frequencies. If rf from the cabinet field is transferred to the audio equipment, it can be rectified and may show up as noise or feedback. A single common ground point from the transmitter base to a good grounding system, such as a water pipe or actual earth ground is recom-

mended. A grounding stud is located adjacent to the AC Input terminal board.

Installation is now complete and the station transmission line may now be connected at the 7/8 EIA flange (HT 1FM) or N connector (HT 250 and 500FM) at the output of the directional coupler.

2.2.4. Initial Checkout

WARNING

DISCONNECT AND LOCK OUT STATION PRIMARY POWER TO THE TRANSMITTER.

Each transmitter is thoroughly checked out during factory final test but adjustment may be required during installation due to shipping, variations in primary power, antenna systems, or transmission line differences.

A 20k ohm/volt multimeter (Simpson 260 or equivalent) may be required for the checkout.

Before proceeding with the initial FM Transmitter testing, ensure that the FM Exciter is completely installed, all parts are back in position and correctly wired, the transmitter is connected to a suitable rf load, and all signal monitors are connected. It is recommended that the Modulation Monitor be connected to the BNC jack located on the output side of the Lowpass Filter.

The complete transmitter should be inspected at this time. Use a vacuum cleaner and thoroughly clean the interior of the transmitter. Check the following:

- That the primary power is connected to the proper voltage taps but is switched OFF.
- That the primary power is connected to the FM Exciter rear plug.
- That the audio inputs are connected to the FM Exciter.
- That all connections at terminal boards and components are tight.
- Remove any extra hardware lying within the cabinet and tighten all nuts and bolts.
- Check relay and solenoid armature operation manually. Ensure all have free, unobstructed movement.
- That all wires and cabling are dressed properly and secured.
- Refer to the Factory Test Data Sheets supplied with the transmitter and adjust the controls as indicated. The transmitter was checked into a 50-ohm resistive load at the Factory. Therefore, any system with a mismatch may change the settings. In this case the recorded control indications may not agree exactly with actual operation.
- Set the REMOTE/LOCAL switch to LOCAL.

2.2.5. Connections to Remote Controls

The FM Transmitter may be operated by remote control by installing a remote control system. If the transmitter is to be remotely controlled, it is important to initiate thorough inspection and maintenance procedures at the transmitter location. Installation of equipment to monitor temperature and humidity at the remote transmitter site is also recommended. Terminations provided in the FM Transmitter allow remote

control of the following transmitter functions by connection to terminal boards on the controller, A1TB1 and the Exciter, A7A3TB1. Complete connections to terminal board A1TB1 &/or A7A3TB1 are shown in Table 2-1.

2.2.6. External Fail-Safe Interlock Connections

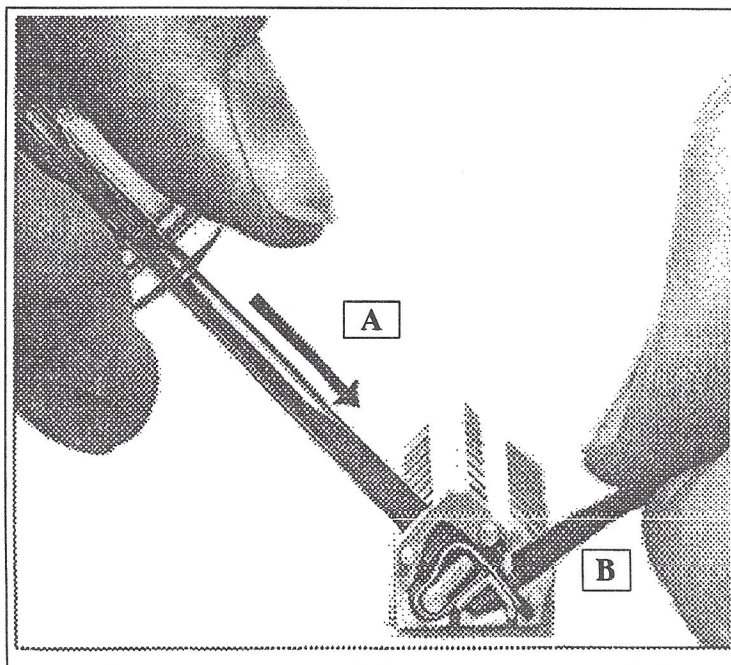
Remove the jumper between terminals 9 and 10 on terminal board A1TB1 on the Controller. Terminal board is located at the upper rear of the transmitter on the rear of the Controller chassis.

Connect the remote external fail-safe interlock wiring to the terminals listed in the preceding paragraph. A set of normally closed contacts is required when the remote control is operational to operate the ac contactor circuit.

If a separate Stereo Generator is to be used, there is rack space directly above the exciter provided for this equipment. The PGM cable between the Stereo Generator and the exciter should be no longer than 24 inches.

2.2.7. EBS Connections

Emergency Broadcast System (EBS) muting can be accomplished through the RF MUTE line on the rear of the THE-1 Exciter. This will turn the RF output to 0W upon application of the proper signal. This has selectable logic by jumper A3J13 on the Exciter motherboard. J13 (C-1) will select ground to mute (open collector compatible). J13 (C-2) will select 2-30Vdc to mute. Refer to Exciter manual for further details.



To prepare wire, strip insulation back approximately 1/4" and twist strands back into their natural position.

A small flat blade screwdriver is an appropriate tool to use to make the connection. To make connection, align wire in side opening "B" and depress clamp down from opening "A" with tool. Insert wire or component in opening "B" and secure by withdrawing tool.

Figure 2-1. Making Connections to WAGO Block

TABLE 2-1. User /Transmitter Interconnections A1TB1

Terminal	Nomenclature	Signal
TB1-1	EXT INTLOCK +, EXT INTLOCK -	Provision for an external TB1-2 interlock input is provided between terminals 1 and 2. This will inhibit transmitter operation if the circuit is broken. If this provision is not used, a jumper must be placed between terminals 1 and 2.
TB1-3	SPARE	Spare input. No connection.
TB1-4	SPARE	Spare input. No connection.
TB1-5	POWER FAULT	Provides external alarm of an output power fault set by R9.
TB1-6	BALANCE FAULT	Provides external alarm of an reject load fault set by R16.
TB1-7	SWR FAULT	Provides external alarm of VSWR foldback set by R64.
TB1-8	INTLOCK FAULT	Provides status of the external interlock. If not used, a jumper must be placed between TB1-1 and TB1-2.
TB1-9	FAILSAFE	A continuously closed contact between this contact and COMMON is required to activate the TRANSMITTER. This contact is maintained as a failsafe for remote operation.
TB1-10	COMMON	Controller chassis ground.
TB1-11	EXT FORWARD	Provides a remote indication of forward power. 1.8 Vdc typical signal at rated output power.
TB1-12	EXT SWR	Provides a remote indication of SWR. 1.0 Vdc typical signal at 1.5:1 VSWR at rated output power.
TB1-13	EXT V	Provides a remote indication of PA collector voltage. 4.1V typical signal at 50V.
TB1-14	EXT I	Provides a remote indication of PA collector current. 1.8V typical signal at 40A.
TB1-15	SPARE	Spare input. No connection.
TB1-16	REMOTE ON	Remote TX ON command input. Connect to COMMON to activate. (Open collector compatible.)
TB1-17	REMOTE OFF	Remote TX OFF command input. Connect to COMMON to activate. (Open collector compatible.)
TB1-18	REMOTE RAISE	Remote power raise command input. Connect to COMMON to activate. (Open collector compatible.)
TB1-19	REMOTE LOWER	Remote power lower command input. Connect to COMMON to activate. (Open collector compatible.)
TB1-20	REMOTE COMMON	Controller chassis ground.

All control functions must be connected through N.O. contacts to common at A1TB1 terminal 20 on the Controller. Alarms and indicators must be connected through lamps or relays to +15 volts. Lamps, LED's, and relays should not require more than 10mA to operate.

SECTION III OPERATION

3.1. Introduction

This section contains operating procedures and information pertaining to identification, location, and function of the controls and indicators on the HT line of Solid State FM Broadcast Transmitters, setup, and operation procedures.

3.2. Controls and Indicators

Figures 3-7, 3-9, and 3-11 show the location of all FM Transmitter controls and indicators. Tables 3-4, 3-6, and 3-8 list all of the controls and indicators with the function of each item listed.

Controls and indicators for the FM Exciter are described in the HARRIS FM Exciter Technical Manual.

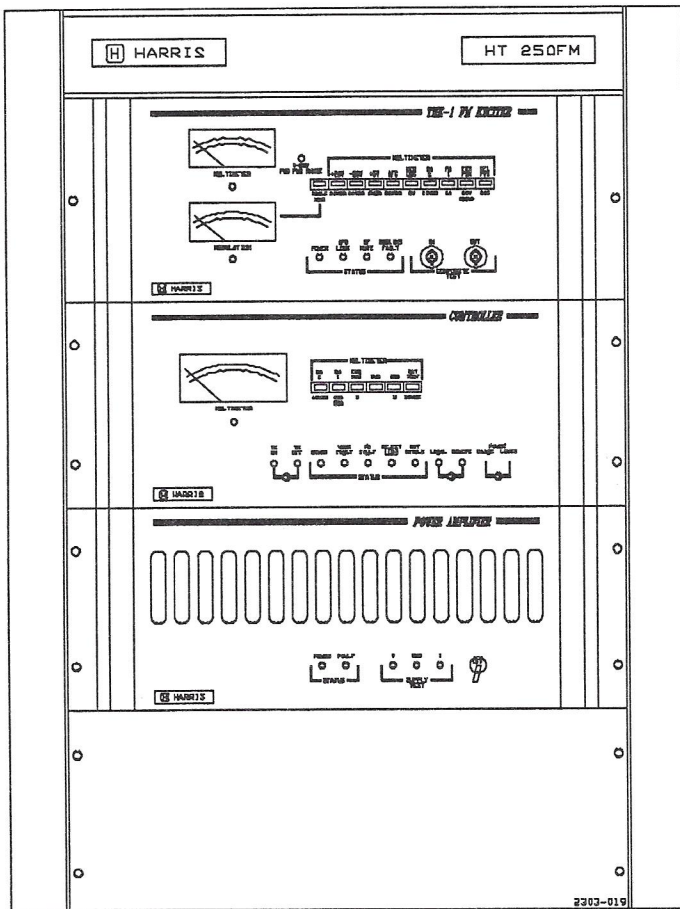


Figure 3-1. HT 250FM Front View

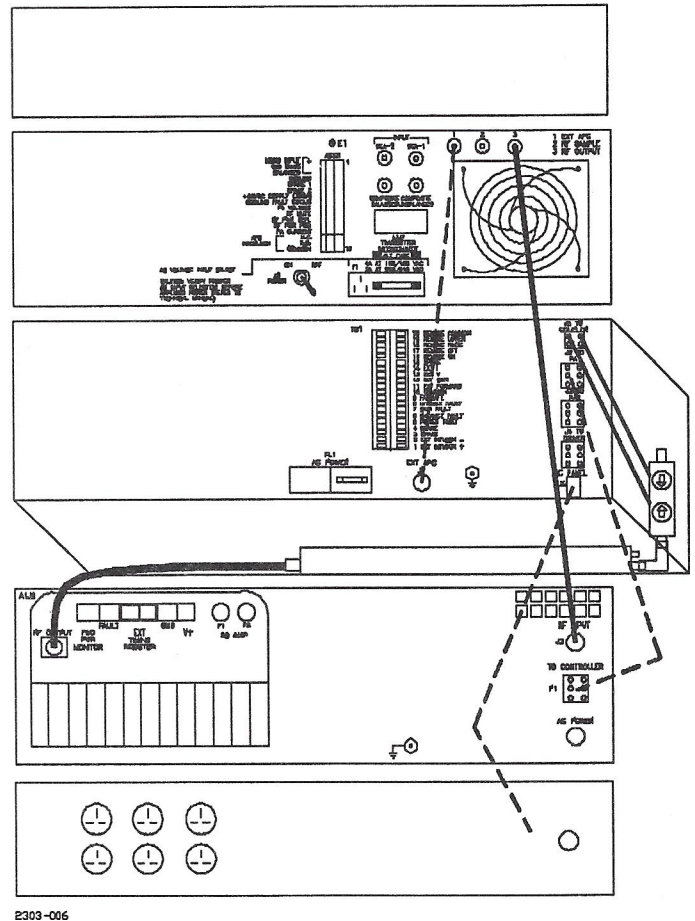


Figure 3-2. HT 250FM Rear View

Equipment	Refer To Page:
THE-1 Exciter	See separate Technical Manual 988-2283-001
Controller	3-4
PA Amplifier	3-5

Table 3-1. HT 250FM Control and Indicator Index

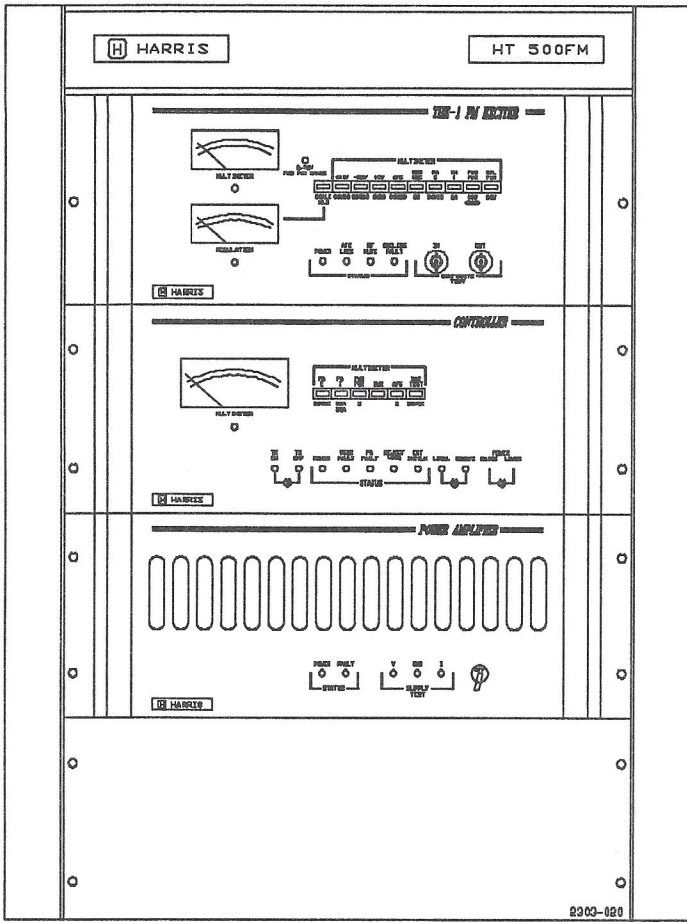


Figure 3-3. HT 500FM Front View

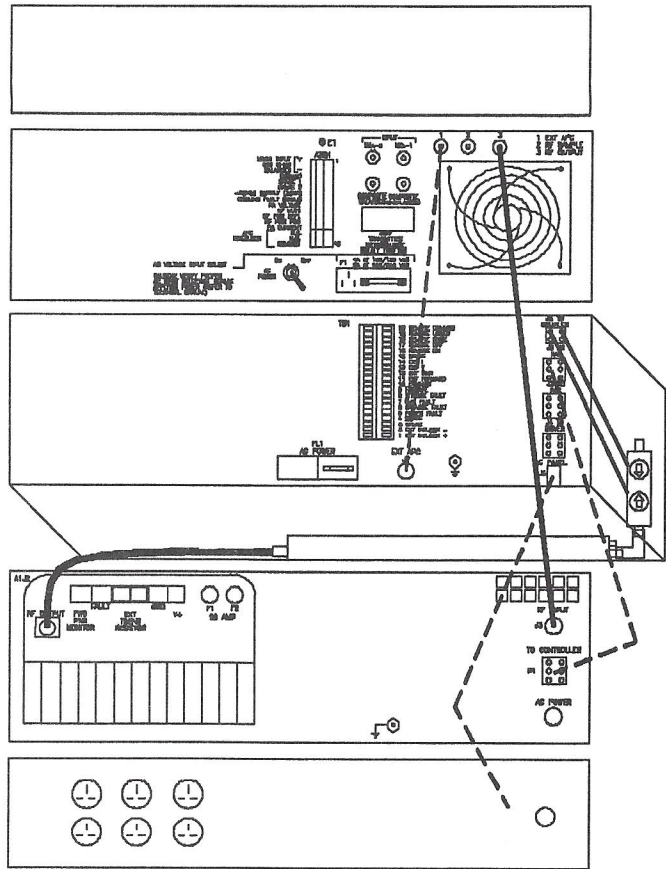


Figure 3-4. HT 500FM Rear View

Equipment	Refer To Page:
THE-1 Exciter	See separate Technical Manual 988-2283-001
Controller	3-4
PA Amplifier	3-5

Table 3-2. HT 500FM Controls and Indicators Index

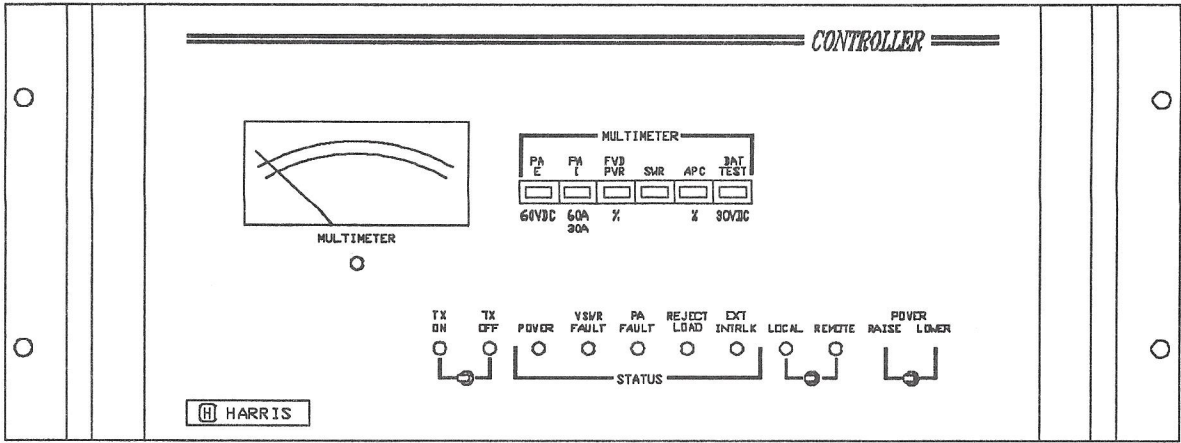


Figure 3-7. Controller Front View

CONTROL/INDICATOR	FUNCTION
MULTIMETER	
PA E 60VDC	Displays power amplifier voltage
PA I 60A/30A	Displays power amplifier chain total current
FWD PWR %	Displays forward power for transmitter
SWR	Displays reflect power for transmitter
APC %	Displays % of Power Control range. 80% is normal.
BAT TEST 30VDC	Displays condition of 9V battery, if used.
TX ON/TX OFF	Toggle switch to control transmitter ON/OFF functions. LED indicators show status.
STATUS	
POWER	When illuminated, indicates power applied to transmitter
VSWR FAULT	When illuminated, indicates VSWR Fault limit set by R-64 has been exceeded.
PA FAULT	When illuminated, indicates a PA FAULT has been detected
REJECT LOAD	When illuminated, indicates the REJECT LOAD limit set by R-16 has been exceeded
EXT INTRLK	When illuminated, indicates the External Interlock chain has been broken
LOCAL/REMOTE	Switch/indicator selects and displays control status
POWER RAISE/LOWER	Raises or lower transmitter power output

Table 3-4. Controller Front - Controls and Indicators

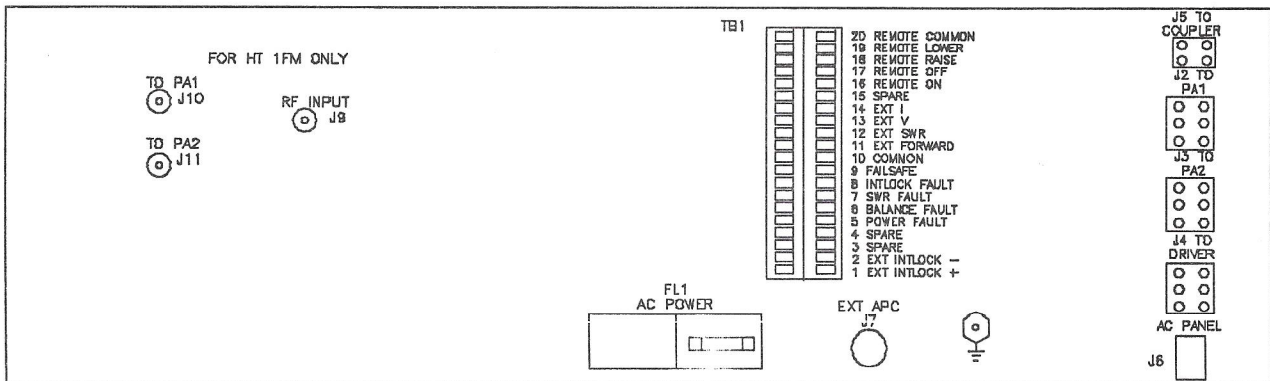


Figure 3-8. Controller Rear View

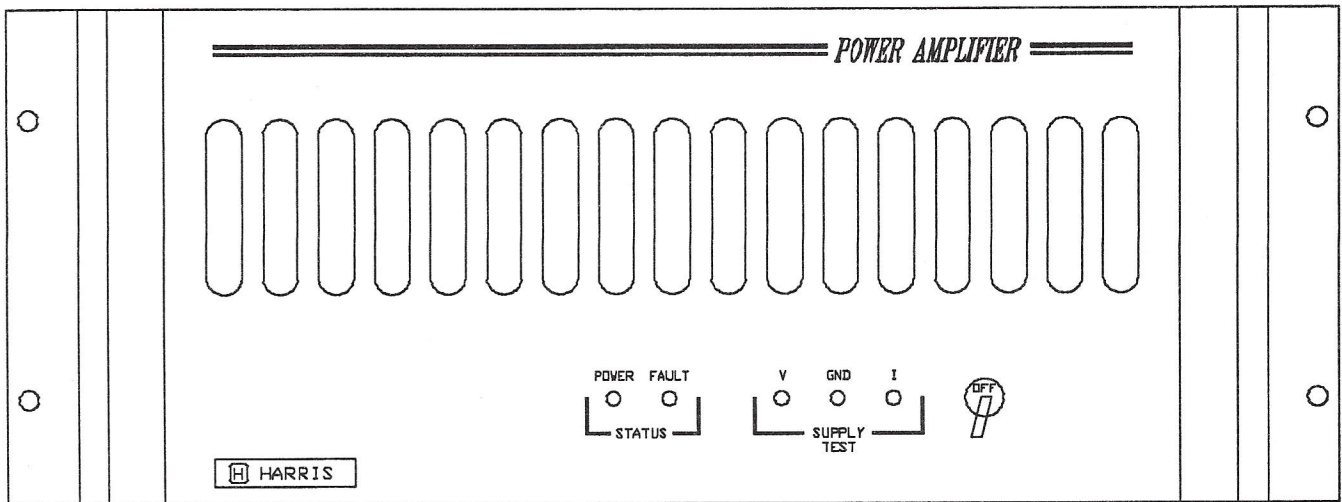


Figure 3-9. PA Amplifier Front

CONTROL/INDICATOR	FUNCTION
STATUS	
POWER	Indicates power is applied to power amplifier
FAULT	Indicates a fault has been detected in power amplifier
SUPPLY TEST	
V to GND	Gives a reading of power amplifier voltage
I to GND	Gives a voltage reading that indicates power amplifier current (0.1V per amp)

Table 3-5. PA Amplifier Front - Controls & Indicators

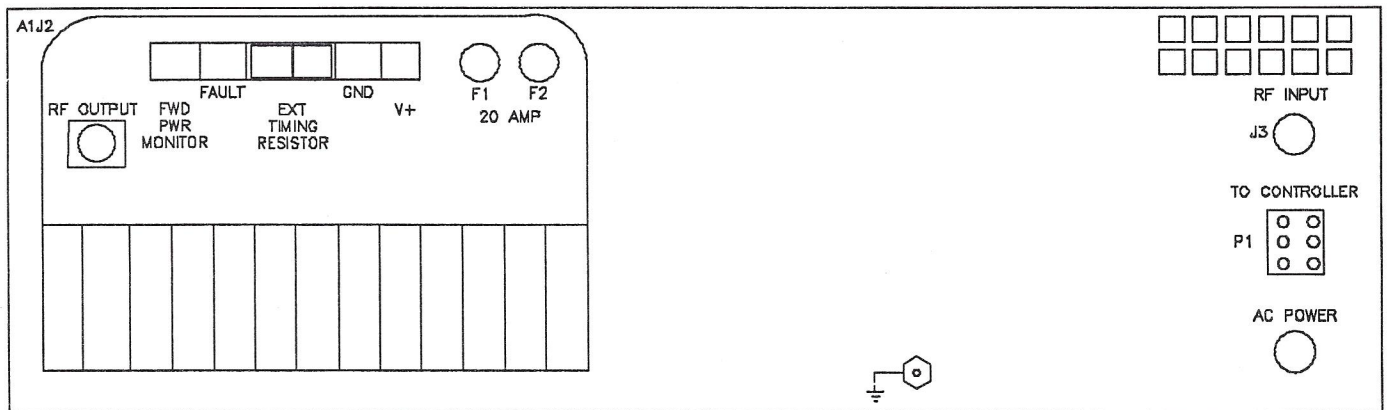


Figure 3-10. PA Amplifier Rear View

888-2312-001

WARNING: Disconnect primary power prior to servicing.

3.3. Preoperational Checks

- a. Check that the jumper wire from terminal 9 to terminal 10 on terminal board A1TB1 is connected or that the remote control system's failsafe contacts have been connected to these terminals as described in Section II.
- b. Check that the jumper wire from terminal 1 to terminal 2 on terminal board A1TB1 (External Interlock) or that the appropriate external contacts have been connected.
- c. Check that the tap connections are correct on the transformers in the PA unit(s) for the station ac line voltage to be used.
- d. Install the rear safety cover on the AC Distribution Assembly and tighten the four fasteners with a nut driver. **THIS COVER IS FOR OPERATOR SAFETY AND IS NOT INTERLOCKED.**
- e. Check that the Exciter power switch is set to the ON position. Set the front panel REMOTE/LOCAL switch to the LOCAL position. Set the front panel circuit breakers to the OFF (down) position.

3.4. Transmitter Turn On and Checkout

The operation procedure is presented under the assumption that the transmitter has been thoroughly and properly aligned and is free of any discrepancies. Visually inspect the transmitter to ensure that all parts and components are properly installed, and all connectors are secure.

The Transmitter ON-OFF is controlled by a single switch on the front panel of the Controller. There are no daily adjustments that are required during normal operation since all critical functions in the Transmitter are stabilized by automatic control circuits and feedback loops. Transmitter operating parameters should be measured in accordance with station requirements for logging of meter readings.

Activate the STATION AC POWER source to the transmitter.

The POWER, TX OFF, and LOCAL LED's should illuminate.

3.4.1. Power Raise & Lower

This paragraph is to verify the POWER RAISE and LOWER circuit is functioning properly. Before turning the transmitter on, press the Multimeter APC switch and verify that the APC voltage reads 0%. If it does

not, press the POWER LOWER switch until the APC voltage reads 0.

- a. Set the front panel circuit breakers to the ON (up) position. Depress the TX ON switch. The multimeter PA E position should indicate 50 +/- 1 volts. The multimeter PA I position should indicate less than 1 Amp.
- b. Switch the Multimeter to the FWD PWR position.
- c. Press the POWER RAISE switch and hold until 50% power is reached. This may take 15 seconds. *2:46pm 11/15/90 ON*
- d. Check the VSWR on the transmission line. Push the Multimeter switch to the VSWR position. The meter should indicate very low VSWR. Operate the switch to the FORWARD position.
- e. Check the Exciter power output indication on the Exciter OUTPUT Meter.
- f. Press the POWER RAISE switch and hold until 100% power is reached.

Although the transmitter will operate into a 2:1 mismatch (with the VSWR trip point appropriately adjusted), it is recommended that the VSWR be kept to a minimum. The trip point is factory adjusted for a 1.6:1 threshold. A 1.1:1.0 mismatch is considered satisfactory. If a high VSWR is indicated, it is generally traced to transmission line or antenna problems.

3.5. Transmitter Shutdown

To turn the transmitter OFF, press the TX OFF switch. Note that the TX ON-OFF toggle switch is latching in the OFF position. This is to prevent the transmitter from being activated by a remote TX ON control command even if the LOCAL/REMOTE is in the REMOTE. The transmitter must be turned ON locally, or the switch returned to its center position before remote ON commands will be accepted.

3.6. PA Bypass Procedure

WARNING

ENSURE THAT THE TRANSMITTER IS OFF BEFORE PERFORMING THE FOLLOWING STEPS.

3.6.1. Single PA Bypass Procedure - (HT 1FM)

To check the operation of a single PA or to operate a single PA in the event of a failure:

WARNING
ENSURE THAT ALL POWER IS REMOVED FROM THE TRANSMITTER BEFORE PERFORMING THE FOLLOWING STEPS.

- a. Disconnect primary power.
- b. Remove the two cables from J1 and J2 on the combiner.
- c. Unplug the Combiner Reject Load Sense cable from the Controller at J8.
- d. Extend the upper Amplifier chassis about 12 inches to gain access to the two screws securing the Combiner assembly to the Controller shelf. Remove the screws and separate the combiner from the Lowpass filter.
- e. Attach the Output cable from the PA to be operated to the input of the Lowpass filter.
- f. Remove the input cable from the PA to be operated and attach the cable from the Exciter output presently connected to J9 on the Controller (splitter).
- g. Adjust the Exciter drive level for output power, but do not exceed 500 Watts output.

3.6.2. PA Bypass Procedure — HT 500 and 250FM

During a situation where the PA stage of the transmitter has failed completely, the Exciter can be connected directly to the antenna.

WARNING

ENSURE THAT THE TRANSMITTER IS OFF BEFORE PERFORMING THE FOLLOWING STEPS.

To operate the exciter directly into the antenna:

- a. Disconnect the PA output cable from the Lowpass filter input.
- b. Attach the BNC to N adaptor (attached to the rear of the Controller by a plastic clip) to the Lowpass Filter input.
- c. Disconnect the Exciter output cable from the PA RF Input, J3.
- d. Connect the Exciter output to the Lowpass filter input.
- e. Adjust the Exciter drive level for output power, but do not exceed 55 Watts output.

3.7. Overload Set Procedure See paragraph 5.7

SECTION IV PRINCIPLES OF OPERATION

4.1. Introduction

This section contains circuit descriptions of the FM BROADCAST TRANSMITTER.

4.2. FM Exciter

Refer to the Exciter Technical Manual.

SPLITTER (used in HT 1FM only)

The FM Exciter output is connected to the input of the two-way splitter at J9 on the back panel of the CONTROLLER. The splitter divides the drive signal into two equal outputs for the two POWER AMPLIFIERS. The outputs of the splitter at J10 and J11 are connected to the input connectors of the 500W PA's.

4.3. 500 Watt Power Amplifier (PA)

The Power Amplifier of the FM Transmitter uses eight transistors in two push-pull parallel pairs operating class C. All of the impedance matching is done with broadband transformers. No tuning is required. The amplifier module includes circuitry which protects itself from excessive supply voltage, SWR in excess of 2.5:1, overdrive, and over temperature operation. Any operating condition which results in exceeding the protection thresholds will automatically disable the amplifier and report out a "PA FAULT" condition to the controller.

The power supply for the amplifier is doubly regulated. The ferroresonant transformer provides an almost constant output voltage regardless of the line voltage as long as the output is loaded. The series pass regulator section provides low load regulation and ripple reduction, and overcurrent protection. The regulator consists of four series pass transistors connected in parallel and controlled by IC U1. The output of the regulator is variable from 45 to 55 volts at 25 amperes of current.

4.4. 250 Watt Power Amplifier (HT 250FM only)

The 250 Watt Power Amplifier uses four transistors in two push-pull pairs operating class C. All of the impedance matching is done with broadband transformers. No tuning is required. The amplifier module includes circuitry which protects itself from excessive supply voltage, SWR in excess of 2.5:1, overdrive, and over temperature operation. Any operating condition which results in exceeding the protection thresholds will automatically disable the amplifier and report out a PA FAULT condition to the controller.

The power supply for the amplifier is doubly regulated. The ferroresonant transformer provides an almost constant output voltage regardless of the line voltage as long as the output is loaded. The series pass regulator section provides low load regulation and ripple reduction, and overcurrent protection. The regulator consists of four series pass transistors connected in parallel and controlled by IC U1. The output of the regulator is variable from 45 to 55 volts at 15 amperes of current.

4.5. Power Combiner (HT 1FM ONLY)

The output of each of the 500W PAs are combined in a Wilkinson type combiner. The signals are in phase and, within reasonable limits, the same power level. Isolation between the input ports of the combiner is 25 dB. This prevents forward power from one amplifier being sensed as reflected power by the other amplifier. Any difference in phase or power between the two PA output signals is dissipated in the reject load, R1. If one of the Power Amplifiers fails, half of the remaining power is dissipated in the reject load and half is delivered to the antenna. At full 1 KW power with APC operating, this fault condition can result in more than the specified dissipation in the reject load.

To prevent this condition and to provide a fault alarm, the voltage across R1 is monitored by transformer T1 and associated components, R2, CR1 and C1. The voltage sensed across the reject load is passed to a comparator in the controller via connector J8. When the reject load voltage exceeds the level set by R16, the Reject Load fault latch is set and the drive power is reduced to prevent damage to the reject load resistor. Operation continues at reduced power as determined by R63.

4.6. Output Lowpass Filter

Harmonics are attenuated with an Output Lowpass Filter that passes the carrier frequency but attenuates the carrier harmonics and any spurious signals. A fixed tuned elliptical type filter, it passes the complete Commercial FM Broadcast Band (87.5-108MHz) and gives the necessary attenuation to the harmonics to meet FCC requirements. The filter also contains a sampling coupler which provides a -35 dBc sample of the output signal for monitoring purposes. No tuning or adjustment is necessary.

4.7. Output Directional Coupler

The Output Directional Coupler is a short section of transmission line with coupling and rectifying elements to give a dc voltage to indicate the forward-going power. The same procedure is used to give a reflected power indication. The detector elements are replaceable and are selected for the particular transmitter output power. The reflected power elements are 10 dB more sensitive than the forward power elements in order to provide accurate measurement of low SWR values. Both forward and reflected sample voltages are amplified by the control board and then used to drive the output meter and the APC and SWR foldback loop.

4.8. Controller

The Controller chassis contains the Control printed-circuit board, Power supply board, and the Interface board. The circuitry is in five logically independent sections which will be discussed separately. The sections are, 1) the Power Supply, 2) the Operating circuits, 3) the Metering circuits 4) Overload and Alarm circuits, and 5) Power Control circuits. Portions of each of these groups are involved with the AC Restart facility.

4.8.1. Power Supply

(Refer to Figure 4-4.)

The Controller circuits are powered by a dual regulator system with capacitive storage backup on the positive supply. Optional battery backup is also provided. This system begins with a dual 15-volt Power Supply on the bottom of the chassis. The negative side is regulated by integrated circuit U2 to -15 volts. The positive side of the power supply is regulated to +15 Volts by integrated circuit U1. The +15 volts is used to charge capacitors C44, C50 and C51 through isolation diode CR40 to provide the +B (Battery) line. Diode CR27 assures equal voltages on the +15 and +B line. The optional battery is isolated from the +B line by diode CR42 which prevents any discharge of the battery until the capacitors have discharged below the nominal voltage of the battery.

During a power failure the +15 and -15 volt regulator circuits are inoperative, but the +B line maintains a voltage due to the charge on capacitors C44, C50 and C51. Since all of the circuits powered by the +B line are low power CMOS logic circuits, the current drain is very low and sufficient voltage is available to retain the logic levels for

Efficiency vs Power Out

HT 1FM

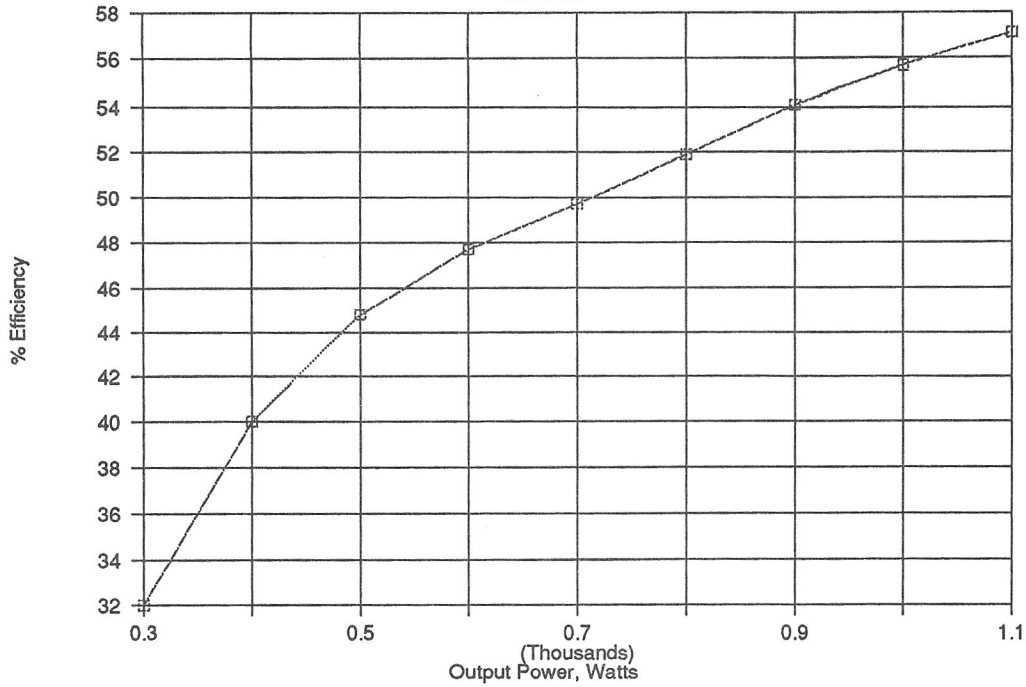


Figure 4-1. HT 1FM Efficiency Curve

Efficiency vs Power Out

HT 500FM

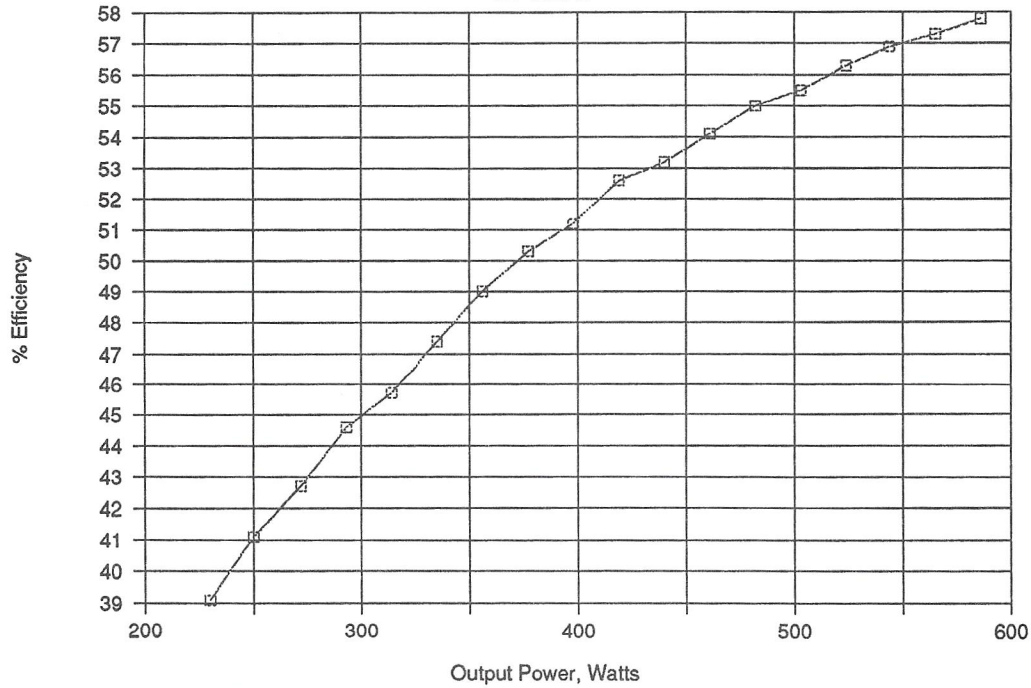


Figure 4-2. HT 500FM Efficiency Curve

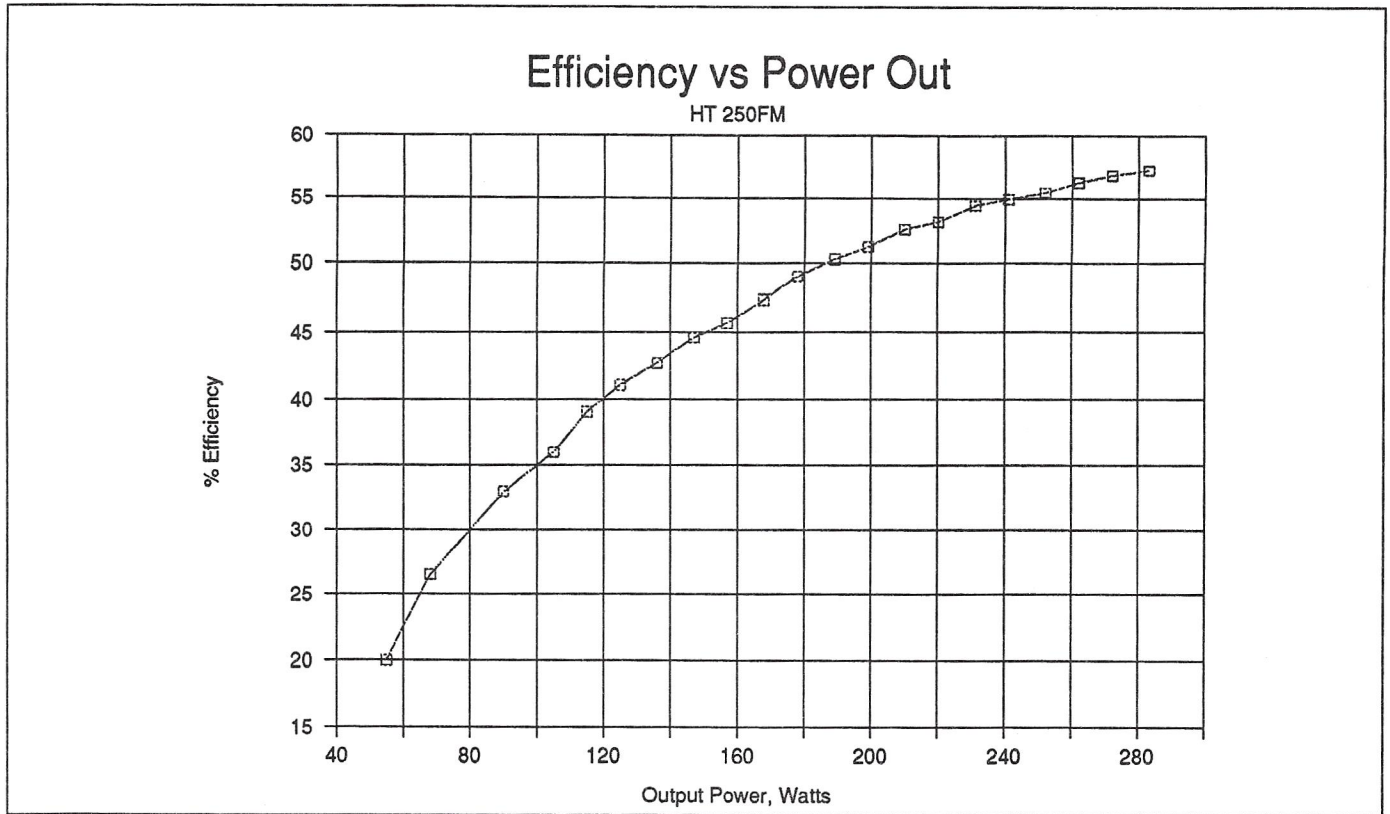


Figure 4-3. HT 250FM Efficiency Curve

more than three hours. If the battery is installed, the retention time is increased to several days. The circuit will continue to remember the transmitter status with this voltage as low as 3 volts, allowing correct AC restart operation after power outages as long as a week.

The + and - 15-volt lines, +B, and the battery sense line are carried to the Controller through the ribbon cable which terminates at receptacle J5 on the Controller printed-circuit board. Front panel POWER LED DS6 (Green) indicates the presence of both these voltages since the 15V zener diode CR32 prevents DS6 from functioning on one supply alone.

The Battery test pushbutton on the Multimeter switch S7 connects the battery to the meter circuit only while the pushbutton is depressed. This prevents the accidental discharging of the battery by the meter circuit.

Several of the integrated circuits used in the Controller are capable of having their output circuits placed in a high-impedance state (referred to as tri-state). This capability permits the separation of circuits which remain active during a power failure from those which are allowed to become inactive. The switching to or from this tri-state condition is controlled by integrated circuit U17/5-6. The input of this integrated circuit

is connected through a Zener diode to the portion of the Power Supply (+15) which becomes inactive during a power failure. The action of this circuit is such that a reduction in the +15-volt supply below about 12 volts causes the output of integrated circuit U17/5-6 to go to the "HIGH" (logic 1) state. This causes the tri-state de-

vices to switch their outputs to the high-impedance state.

The result of this is that devices which are not connected to the +B circuit will not consume battery power from those devices which are operating from battery power. Integrated circuit U17/8-9 provides the complement of the "state-control" circuit

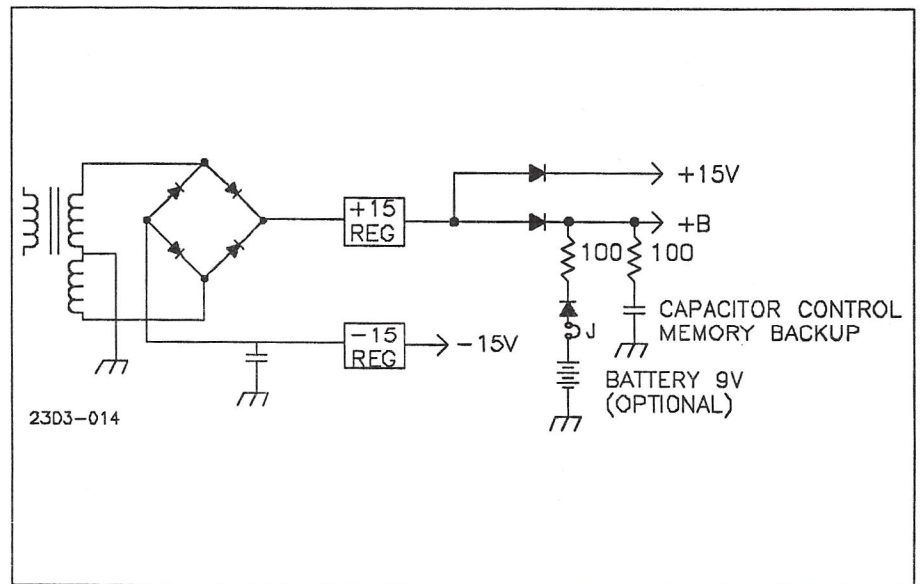


Figure 4-4. Controller Power Supply

for those devices which need a "LOW" (logic 0) during power failure.

4.8.2. Operating Circuits

(Refer to drawing 839 7909 004.)

Control of the Operating Circuits is by way of either Front Panel toggle switches or Remote Control inputs. Remote Control circuits require an open collector logic "LOW" or "ON" connected between the control input and the controller logic common. Remote Control inputs are enabled or disabled by the REMOTE/LOCAL switch located on the Controller front panel. Note that all remote control command input lines and status output lines are isolated through opto-couplers. This provides noise and transient immunity for the Controller. When the REMOTE/LOCAL switch is in the LOCAL position, front panel LOCAL LED DS1 (red) is illuminated and a shunt circuit exists for all of the Remote Control inputs, preventing them from having any influence on the transmitter control circuits. When the REMOTE/LOCAL switch is not in the LOCAL position, the shunt circuits do not exist and the Remote Control inputs have exactly the same functions as the transmitter front panel pushbutton switches.

The requirement for an "TX ON" condition is a logic "HIGH" at the input of U10/13-7. This sets the On/off latch, integrated circuit U7A, a dual "D"-type flip-flop. One-half is the POWER ON/OFF Memory circuit, the other half is the Reject Load fault memory circuit. Similarly, the requirement for an "OFF" condition is a logic "high" at the input of U10/11-9, which resets the on/off latch, U7A. Diode CR19 maintains "OFF" priority for simultaneous ON and OFF commands. The state of the on/off latch is indicated "OFF" by LED DS4 red and "ON" DS5 green. The ON/OFF latch is powered from the +B line and will remember its state regardless of the presence of line power.

The inputs and outputs of U7 are connected to tri-state gates to prevent discharge of the +B line which powers them. The output of the ON/OFF latch drives the AC line contactor relay drive transistor, Q8. The Emitter of Q8 is routed to the Controller terminal board, TB1, to obtain the failsafe function. This circuit must be completed for the contactor to function and for the POWER ON LED DS4 to illuminate. As long as the +B line remains higher than 3 volts, either by capacitive or battery power, the ON/OFF latch will remember the state of the transmitter upon return of line power.

4.8.3. Metering Circuits

(Refer to drawing 839 7909 004.)

A multimeter is located on the front panel of the transmitter Controller. The following indications may be selected by the multimeter selector switch:

- a. PA E (PA VOLTAGE)
- b. PA I (PA CURRENT)
- c. FWD PWR (Forward Power)
- d. SWR
- e. APC
- f. BATTERY TEST

Because of the architecture of this solid state transmitter, the conventional "plate" metering circuits common to tube transmitters are not used. First, since the controller is common to all the transmitters in the family, the current meter must sum the current readings from the PA's. The voltmeter must take the average. Second, because there is no "tuning" involved, the voltage and current readings take a secondary importance to the output power reading.

Six functions are metered on the front panel multimeter: PA voltage and current, forward and reflected power (displayed as SWR), APC control voltage and BATTERY voltage. The first four are available on the rear terminal board as positive ground referenced signals for remote control and monitoring. All the remote-reading functions are buffered.

When the multimeter switch selects the PAE voltmeter position, the voltage appearing at the input to voltage follower U6A, scaled by resistor R54 appears on the 0-60 scale. The signals from precision voltage dividers in the individual Power Amplifier assemblies are paralleled at the input to U6A. The effect is to make the output reflect the average of the two samples. If there is only one PA as in the case of the HT 250 and 500, then leaving the other connection open has no effect on the operation of the circuit.

The PA I multimeter is a little different. If there is only one PA, the current sample from the PA is applied to the input of non-inverting amplifier U6B. The scaling resistor and the gain of U6B are such as to make the full-scale reading 30A. If a second amplifier is connected, the current signal from each is scaled by 1/2 by the divider action of the input resistors of U6A and the full scale reading is 60A. The sum of the current signals is displayed.

The Transmission Line directional coupler samples (Forward Power and Reflected Power) are amplified by integrated circuits U3A and U4A. The outputs of these circuits are made available for the remote control equipment and are connected to the multimeter switch S7.

In the FWD PWR position, this switch connects the output of integrated circuit U3A to the meter through resistor R28, which calibrates the meter for the normal operating power of the transmitter.

When the switch is operated to the SWR position, the meter is connected to the Reflected Power circuit (integrated circuit U4A) through SWR Calibrate potentiometer R38, producing a meter deflection which is read on the VSWR scale of the meter. The SWR meter is calibrated by placing SWR CAL switch, S4, in the Calibrate position. Potentiometer R38 is then adjusted to produce the same reading on the meter as in the Forward position.

4.8.4. Overload and Alarm Circuits

(Refer to drawing 839 7909 004)

Forward Power is also connected to the Automatic Power Control circuit and the Power Out fault detector. The APC function is described later. The Power Out fault is a simple comparator which compares the output power signal against a reference established by R9, the LOW PWR trip set. This allow a remote alarm to be set when the output power falls below the trip setting.

Reflected Power is also connected to the SWR FOLDBACK alarm output. This Setting is normally established at 1.6:1 SWR by potentiometer R9.

The Reject Load Detector is a comparator which monitors the voltage from the sensor on the Combiner reject load. Should there be a failure of one of the two PAs (HT 1FM only) the reject load fault latch, U7B is set, the fault is alarmed, and the drive is reduced to the remaining amplifier. This fault latch can be reset by issuing another TX ON command, but will be immediately set again if the fault is not cleared.

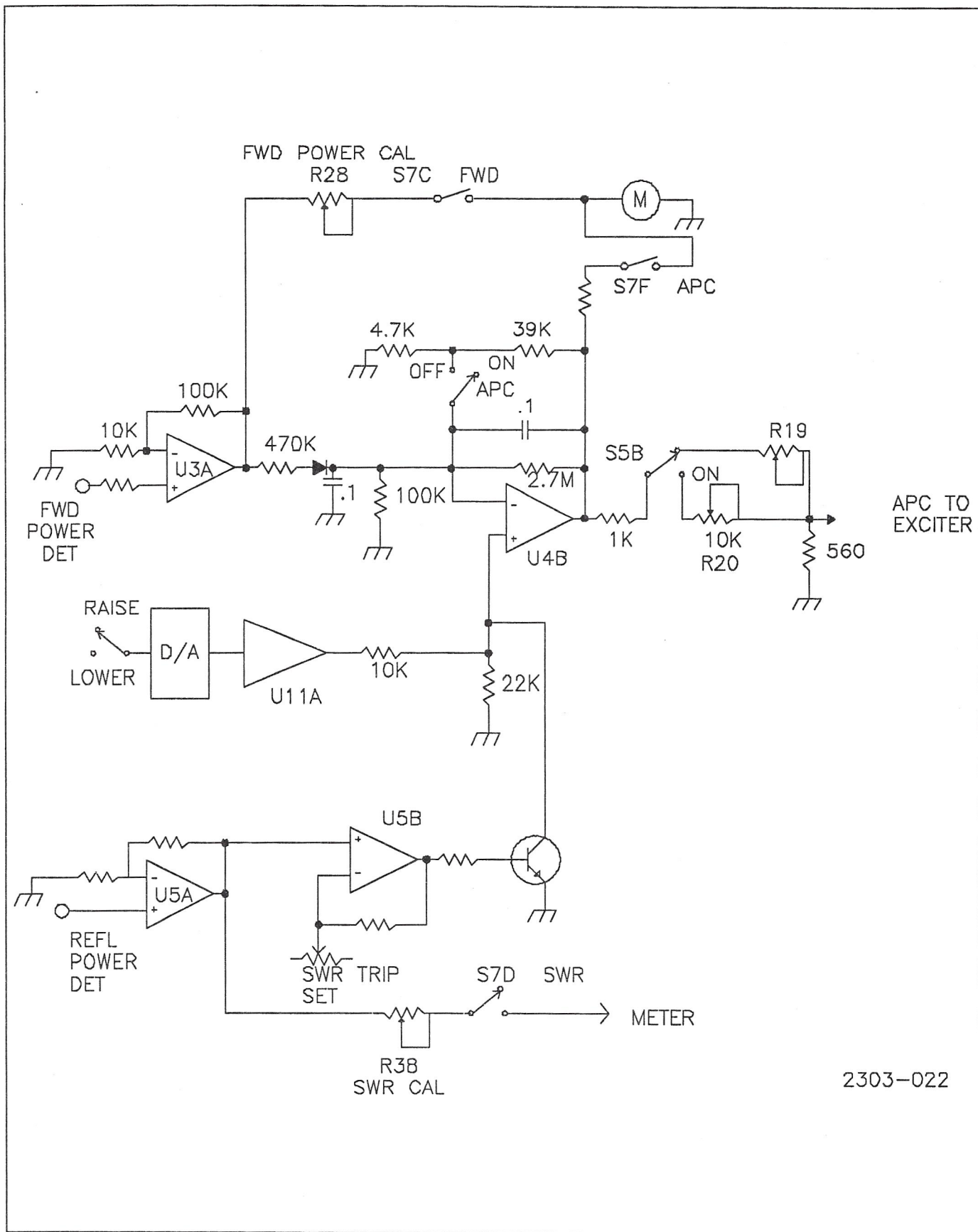
4.8.5. Power Control Circuits

(Refer to Figure 4-5.)

The Power Control Circuits may be divided into several logical groups.

The first logical circuit to be considered is the APC Level generator. This circuit uses digital techniques to derive an analog voltage which serves as the APC reference level. The heart of the circuit is an eight-bit counter consisting of integrated circuit U27 (lower four bits) and integrated circuit U21 (upper four bits). These counters are connected in cascade and the count is changed by providing UP or DOWN pulses to integrated circuit U27. Each pulse causes the counter to increment by one count in the desired direction.

The pulses to be counted are being generated continuously by integrated circuit U17F. They are shaped for a small duty-



2303-022

Figure 4-5. Power Metering and Control

cycle to minimize contact bounce problems in the Raise-Lower switches (Local or Remote). Raise or Lower inputs are routed to integrated circuits U20B and U20A which gate the pulses from integrated circuit U17F to the proper integrated circuit U27 input. The output of integrated circuits U27 - U21 is buffered by integrated circuit U28 and connected to integrated circuits U29, U30 and U31. Integrated circuit U30 is a top-limit sensor, in that it changes its output when all of its inputs are in the "HIGH" state (maximum count). This inhibits integrated circuit U20B and prevents further counting in the "UP" direction. Similarly, integrated circuit U29 senses the bottom condition, inhibiting integrated circuit U20A and preventing further counting in the "DOWN" direction.

Integrated circuit U31 is a Digital-to-Analog converter, providing an output in the range of 0 (for an input count of 0) to -10 volts (for an input count of 255). Integrated circuit U11A inverts this voltage so that it is in the range of 0 to +2V. This APC Level signal is connected to the APC integrated circuit U4B. Note that the count cannot be changed during a power failure, as inte-

grated circuits U20B and U20A have inputs connected to the Power/Enable circuit.

The basis for developing power control voltage for the transmitter is integrated circuit U4B. The control voltage is sent through the APC line to the Exciter where it sets the output drive level. With the APC switch, S5, in the OFF position, the gain of U4B is set by R10 and R11. U4B simply acts as a non-inverting amplifier. The power control voltage from the D-to-A converter is fed to U4B-5. As the voltage increases, the output from U4B-7 increases. This voltage is then divided down by R19, R1/5-12 and R60 when S5 is in the APC OFF position. R19 sets the maximum voltage and hence, the maximum power available from the exciter in the APC OFF mode. When S5 is switched to the APC ON position, the gain of U4B is set by R12 and R13. The sample of the output power now is directed to the inverting input, U4B-6. Therefore, when the power output increases, the output of U4B will decrease to keep the power the same. In the APC ON condition, the output of U4B is divided down by R20, R1/6-11, and R60. R20 sets the operating gain of the APC loop and determines the maximum drive available from the Exciter.

The reflected power sample output at U5A-1 is connected to U5B-5 which is a comparator for SWR protection. If the reflected power exceeds the reference level established by R64 (VSWR TRIP SET), then U5B will turn on Q4 and reduce the forward power until the reflected power is below the reference defined by R64. U5B also drives transistor Q5 which drives the front panel and remote SWR alarm circuits.

4.8.6. User Interface RFI Filter and Transient Protection

All user control input, monitoring and output connection lines are brought out to a WAGO block on the I/O board on the rear panel of the controller chassis. All the inputs and outputs are RFI filtered and transient protected for maximum system reliability.

4.8.7. AC Power Distribution

All AC power is brought in through the AC Power Distribution Panel. In addition to providing ac interconnection to the different power amplifiers and the Exciter, it contains the main circuit contactor and the line transient protection devices which isolate and protect the transmitter from most service entrance disturbances.

SECTION V MAINTENANCE

5.1. Introduction

This section provides preventive maintenance checks, cleaning, corrective maintenance, and troubleshooting information for the FM BROADCAST TRANSMITTER.

5.2. Purpose

The information contained in this section is intended to provide guidance to establish a comprehensive maintenance program to promote operational readiness and eliminate downtime. Particular emphasis is placed on preventive maintenance and record keeping functions.

5.3. Station Records

The importance of keeping station performance records cannot be overemphasized. Separate logbooks should be maintained by operation and maintenance activities. These records can provide data for predicting potential problem areas and analyzing equipment malfunctions.

5.3.1. Transmitter Logbook

As a minimum performance characteristic, the transmitter should be monitored (using front panel meters) and the results recorded in the transmitter logbook at each shift change or at least once a day.

5.3.2. Maintenance Logbook

The maintenance logbook should contain a complete description of all maintenance activities required to keep the transmitter operational. A list of maintenance information to be recorded and analyzed to provide a data base for a failure reporting system is as follows:

DISCREPANCY

Describe the nature of the malfunction. Include all observable symptoms and performance characteristics.

CORRECTIVE ACTION

Describe the repair procedure used to correct the malfunction.

DEFECTIVE PART(S)

List all parts and components replaced or repaired. Include the following details:

- Component Time In Use
- Component Part Number
- Component Schematic Number
- Component Assembly Number
- Component Reference Designator

SYSTEM ELAPSED TIME

Total transmitter time on.

NAME OF REPAIRMAN

Person who actually made the repair.

STATION ENGINEER

Indicates chief engineer noted and approved the transmitter repair.

5.3.3. Safety Precautions

It is very dangerous to attempt to make measurements or to replace components with power on. The design of the transmitter provides safety features such that when a door is opened, an interlock switch removes transmitter ground. Use the grounding stick to touch every part in the area or circuit on which maintenance is to be performed before attempting maintenance.

5.4. Preventive Maintenance

Preventive maintenance is a systematic series of operations performed periodically on equipment. As these procedures cannot be applied indiscriminately, specific instructions are necessary.

- Visual Inspection.** Inspection is the most important preventative maintenance operation because it determines the necessity for the others. Become thoroughly acquainted with normal operating conditions in order to recognize and identify abnormal conditions readily. The remedy for most visible defects is obvious. However, care must be taken if heat damaged components are located. Overheating is usually a symptom of trouble. It is essential to determine the actual cause of overheating before the heat damaged component is replaced, otherwise the damage will be repeated. Inspect for the following:
 - Overheating, indicated by discoloration, bulging of parts and peculiar odors.
 - Leakage of grease and oil.
 - Oxidation.
 - Dirt, corrosion, rust, mildew and fungus growth.
- Feel.** Check parts for overheating, especially rotating parts such as the blower motor. The need for lubrication, the lack of proper ventilation, or the existence of some defect can be detected and corrected before serious trouble occurs. Become familiar with operating temperatures in order to recognize deviations from the normal range.
- Tighten.** Tighten loose screws, bolts, and nuts. Do not tighten indiscriminately as fittings that are tightened be-

yond the pressure for which they are designed may be damaged or broken.

- Clean.** Clean parts when inspection shows that cleaning is required.
- Adjust.** Make adjustments when inspection shows that adjustments are necessary to maintain normal operation.
- Lubricate.** Lubricate meshing mechanical surfaces at specified intervals with specified lubricants to prevent mechanical wear and keep the equipment operating normally. Do not over-lubricate.
- Paint.** Paint surfaces with the original type of paint (use prime coat if necessary) when inspection shows rust, worn or broken paint film.

5.4.1. Filter Cleaning

An air filter is provided in the front of each amplifier Chassis. Clean the filter once a week with warm water and a mild detergent with replacement done on an as-required basis. Additional filters may be ordered from HARRIS to assist in maintenance.

5.4.2. Blower Maintenance

Inspect the blower and flushing for dust accumulation periodically. Remove dust with a vacuum cleaner and brush. Check the blower for wear. The blower motor bearings are sealed and lubricated for life to provide trouble-free operation. A blower that is noisy or shows wear will require replacement.

Each motor is cooled by the air passing over the motor. If the ambient air temperature is too high or the air flow is restricted, the lubricant will gradually be vaporized from the motor bearings and bearing failure will occur.

If the blower is operated to move very dusty air, the concave side of the impeller blades will collect dust and the dust will build up on the blade surfaces. If this happens, the performance of the blower will be reduced and unbalance will result with a possibility of damage to the blower.

5.4.3. Maintenance Of Components

The following paragraphs provide information for component maintenance.

5.4.3.1. Semiconductors

Routine checking of semiconductors used in the Transmitter is not required.

The best check of semiconductor performance is actual operation in the transmitter. When semiconductors are replaced, check circuitry operation which may be affected. Replacement semiconductors should be of

the original type or a recommended direct replacement. Preventive maintenance of transistors is accomplished by performing the following steps:

- a. Inspect the semiconductors and surrounding area as accumulations of dirt or dust could form leakage paths.
- b. Examine all semiconductors for loose connections or corrosion.

5.4.3.2. Capacitors

Preventive maintenance of capacitors is accomplished as follows:

- a. Examine all capacitor terminals for loose connections or corrosion.
- b. Ensure that component mountings are tight.
- c. Examine the body of each capacitor for swelling, discoloration, or other evidence of breakdown.
- d. Inspect electrolytic capacitors for leakage signs.
- e. Use standard practices to repair poor solder connections with a low-wattage soldering iron.

5.4.3.3. Fixed Resistors

Preventive maintenance of fixed resistors is accomplished by the following steps:

- a. When inspecting a chassis, printed-circuit board, or discrete component assembly, examine resistors for dirt or signs of overheating. Discolored, cracked, or chipped components indicate a possible overload.
- b. When replacing a resistor ensure the replacement value corresponds to the component designated by the schematic diagram.
- c. Clean dirty resistors with a small brush.

5.4.3.4. Transformers

Preventative maintenance of transformers is accomplished by performing the following:

- a. Feel each transformer soon after power removal for signs of overheating.
- b. Inspect each transformer for dirt, loose mounting brackets and rivets, loose terminal connections, and insecure connecting lugs. Dust, dirt, or moisture between terminals may cause flashovers.
- c. Tighten loose mounting lugs, terminals, or rivets.
- d. Clean with a dry lint-free cloth. Use an approved cleaning solvent if required.
- e. Clean corroded contacts or connections with crocus cloth.
- f. Replace defective transformers.

5.4.3.5. Meters

Preventative maintenance of meters is accomplished as follows:

- a. Inspect for loose, dirty, or corroded mountings and connections.
- b. Examine leads for frayed insulation and broken strands.
- c. Check for cracked or broken plastic cases and cover glasses.
- d. Tighten loose mountings or connections. Since meter cases are made of plastic, exercise care to prevent breakage.
- e. Clean meter cases and glass cover with a dry cloth.
- f. Remove dirt from mountings and connections with a stiff brush.
- g. Remove corrosion with crocus cloth.

5.4.3.6. Relays

Replace hermetically sealed relays if defective.

Nonhermetically sealed relays are considered normal if:

- a. The relay is mounted securely.
- b. Connecting leads are not frayed and the insulation is not damaged.
- c. Terminal connections are tight and clean.
- d. Moving parts travel freely.
- e. Spring tension is correct.
- f. Contacts are clean, adjusted properly and make good contact.
- g. The coil shows no signs of overheating.
- h. Clean any dirty or corroded terminal connection or switch section with crocus cloth.

5.4.3.7. Switches

Preventative maintenance of switches is accomplished by checking the following:

- a. Inspect switches for defective mechanical action or looseness of mounting and connections.
- b. Examine cases for chips or cracks. Do not disassemble switches.
- c. Inspect accessible contact switches for dirt, corrosion, looseness of mountings and connections.
- d. Check contacts for pitting, corrosion, or wear.
- e. Operate the switches to determine if each moves freely and is positive in action.
- f. Tighten all loose connections and mountings.
- g. Replace defective switches.

5.5. Corrective Maintenance

Corrective maintenance for the transmitter is limited by the objective of minimum down time. Maintainability and care are considerably simplified for operation and maintenance personnel as the transmitter is designed and built with highly reliable and proven elements to minimize down time.

5.5.1. Troubleshooting

Most troubleshooting consists of visual checks. Because of high voltages present in the transmitter, it is not safe to work with the power energized.

The meters, indicators, and fuses should be used to determine which stage is malfunctioning. The meters which indicate transmitter operating parameters are located across the front of the cabinet. All tuning controls are adjustable in view of the meters. Internal components may be accessed from both the front and rear of the transmitter.

In event of problems, isolate the trouble area to one of the following with the meters and indicators for each section:

- a. Antenna and Feedline
- b. Control Circuits
- c. Splitter (HT 1FM only)
- d. PA Section(s)
- e. Exciter

When the trouble is isolated to a specific area, refer to the theory section of this technical manual for circuit discussion to aid in problem resolution.

Tables 5-1 and Table 5-2 lists some typical trouble symptoms, probable causes, and corrective actions pertaining to the overall Transmitter and to the Controller. The corrective action given for a trouble symptom is not necessarily the only answer to a problem. It only tends to lead the repairman into the area that may be causing the trouble. In event parts are required, refer to Section VI, Parts List.

Prior to starting a troubleshooting procedure check all switches, power cord connections, connecting cables, and power fuses.

5.6. Technical Assistance

HARRIS Technical and Troubleshooting assistance is available from HARRIS Field Service during normal business hours (8:00 AM to 5:00 PM Central Time). Emergency service is available 24 hours a day. Telephone 217/222-8200 to contact the Field Service Department or address correspondence to Field Service Department, HARRIS CORPORATION, Broadcast Division, P.O. Box 4290, Quincy, Illinois 62305-4290, USA. The HARRIS factory may also be contacted through a FAX facility (217/222-7041) or a TELEX service (247319).

5.7. Alignment Procedures

This section of the manual will cover all procedures required to align the modules and assemblies in the Transmitter. These procedures will be listed for each of the modules requiring alignment or adjustment. Adjustments required for a frequency

change are covered in the THE-1 Exciter manual.

5.7.1. Voltmeter and Ammeter Calibration

5.7.1.1. 500 Watt PA Chassis, 250 Watt PA Chassis

This procedure assumes that the amplifier is in proper operating condition and that any problems have been resolved using the Troubleshooting section of the manual for assistance. There are three controls located on the Regulator board which can be reached through the top cover. These controls are for the voltage regulation and metering calibrations and are factory adjusted. No routine alignment of these controls is required unless a component was replaced in the regulator circuit.

Equipment required for Regulator board calibration:

- A voltmeter calibrated to 0.5%.
- A clamp-on ammeter calibrated to 0.5%.
- 50 Ohm dummy load.

If a clamp-on ammeter is not available, a suitably calibrated ammeter can be placed in series with the +50V line to the amplifier module. Be sure the connections are short and tight.

5.7.1.1.1. Voltmeter Calibration

The power supply output voltage is set by R36, "Voltage Adjust", which is accessible through the hole in the top cover of the Amplifier chassis when is pulled out about 8". It may be necessary to temporarily remove the ground strap on the rear panel to obtain enough cable slack to move the amplifier forward.

- Connect the voltmeter between the GND and V test points on the front panel.
- Adjust "Voltage Adjust" control, R36, for a voltmeter reading of 50 volts +/- 0.1V.

5.7.1.1.2. Ammeter Calibration

- Connect the voltmeter between the GND and I test points on the front panel.
- Adjust the "ZERO" control, R60, for a voltmeter reading of 0.0 volts +/- .002mV when no drive is applied to the amplifier.
- Attach the clamp-on ammeter to the service loop in the positive lead connected to the +50V terminal on the rear of the amplifier module.
- Apply normal drive to the amplifier and record the clamp-on ammeter reading.
- Adjust the "I CAL" control, R6, for a voltmeter reading corresponding the 0.1V per amp reading of d. above. i.e.,

for a 12A reading, adjust R6 for 1,20V between the I and GND test points.

5.7.2. Controller Calibration Alarm and Fault Settings

This procedure assumes that the Transmitter is in proper operating condition and that any problems have been resolved using the Troubleshooting section of the manual for assistance. The controls are all located on the top front edge of the Controller chassis and can be reached through the top cover. These controls are factory adjusted. No routine alignment of these controls is required unless a component affecting these circuits has been replaced.

Equipment required for calibration:

- AC/DC voltmeter
- Calibrated power meter capable of measuring the total output power of the transmitter.
- A known good 50 Ohm load
- A small DC power supply capable of 8V output @ 10mA

5.7.2.1. Manual Power Control Limit Setting

This adjustment sets the maximum power available from the Exciter in the Manual mode.

- Connect the EXCITER RF OUTPUT through a calibrated power meter to a known good 50 Ohm load. Connect the power meter as close as possible to output connector as possible to obtain the most accurate power measurement.
- Depress the FWD PWR switch on the EXCITER front panel Multimeter select switches.
- Locate and switch the APC ON-OFF switch, S5, on the Controller top to MAN.
- Turn the transmitter ON and run the PWR RAISE control to the end of its range as indicated on the APC Meter. Adjust the MAN GAIN control, R19, for 55W output from the Exciter.
- Return the Exciter RF OUT to its normal connection.
- Run the PWR LOWER down to 0 as indicated on the APC multimeter setting on the controller before returning the Transmitter to service to prevent overdrive fault.

5.7.2.2. Automatic Power Control (APC) Limit Setting

This adjustment determines the gain of the APC loop and the amount of overdrive available in a fault condition.

- Connect the Transmitter RF OUTPUT through a calibrated power meter to a known good 50 Ohm load. Connect the power meter as close as possible to out-

put connector as possible to obtain the most accurate power measurement.

- Locate and switch the APC ON-OFF switch, S5, on the Controller top to ON.
- Turn the Transmitter ON and raise the output power to 100% TPO as indicated on either the external calibrated wattmeter or the Controller FWD PWR multimeter setting.
- Switch the Multimeter to APC.
- Raise the Transmitter output power to 120% TPO.
- Adjust the LOOP GAIN control, R20, for maximum obtainable reading while using the RAISE-LOWER control to keep the power at 120% TPO.
- Reduce the power to 100% TPO. The APC should indicate 80 to 90%.

5.7.2.3. Forward Power Meter Calibration

- Using the POWER RAISE - LOWER switch, adjust the Transmitter output power to the rated TPO as indicated on the external calibrated wattmeter.
- Switch the Multimeter to the FWD PWR position and adjust the FWD CAL control, R28, for 100% reading on the meter.

5.7.2.4. SWR Meter Calibration

- With the Transmitter output running at 100% TPO:
- Switch the Multimeter to the SWR position.
- From the top cover of the Controller, switch the SWR cal switch, S4, to the CAL position.
- Adjust the SWR CAL control, R38 for a 100% reading on the meter. The Multimeter should now have the same indication in both the SWR and FWD PWR positions.
- Return the SWR - CAL switch to the SWR position.

5.7.2.5. SWR Foldback Trip Point Setting

After checking the calibration of the SWR meter as above:

- Switch the APC ON-OFF switch, S5, to OFF and LOWER the Transmitter output power to 50% TPO.
- Turn the Transmitter OFF.
- Temporarily remove the REVERSE power detector slug from the directional coupler and replace it with the FORWARD power detector slug.
- Turn the Transmitter ON.
- Adjust the SWR TRIP control, R64, until the VSWR FAULT led on the front panel lights.
- Turn the Transmitter OFF.
- Replace the FORWARD and REVERSE power detector slugs in the directional coupler being careful to orient

- them properly. The higher power one is FORWARD, orientation is per the marking on the coupler support bracket.
- h. Return the APC ON-OFF switch to the APC position.

5.7.2.6. Reject Load - Balance Detector Fault Calibration

- a. Turn the Transmitter OFF. Turn off the circuit breaker(s) on the Amplifier(s).
- b. Unplug the reject load detector connector, J8, at the rear of the Controller.
- c. Using a small DC power supply, apply 6.0 volts to the J8 connector pins. J8-2 is positive.
- d. Adjust the BAL SET control, R16, for a REJECT LOAD fault LED indication. The TX ON command resets the fault. There is considerable hysteresis in this control.
- e. Turn the amplifier circuit breakers back on.

5.7.2.7. Setting Foldback Power Level

When the reject balance or the PA fault occurs, the power level is folded back to a safe level to prevent damage to the Transmitter.

- a. Adjust the Transmitter for normal TPO at 100%.
- b. Turn the Transmitter OFF. Turn off the circuit breaker(s) on the Amplifier(s).
- c. Unplug the reject load detector connector, J8, at the rear of the Controller.
- d. Using a small DC power supply, apply 8 volts to the J8 connector pins. J8-2 is positive. This should cause the REJECT LOAD fault LED on the front panel to trip.
- e. Turn the amplifier circuit breakers back on.
- f. Turn the TX ON. Adjust the FOLDBACK control, R63, for 20% TPO.

5.7.2.8. Low Power Trip Set

- a. Place an ohmmeter across the POWER OUT FAULT line, TB1-5 and common.
- b. Turn the Transmitter ON and adjust the output power to 85% TPO (or any desired alarm setting).

- c. While observing the ohmmeter, adjust the PO TRIP control, R9, for a low resistance reading, <500 ohms.

5.8. Procedure for Removing an RF Power Transistor from a PA Module

CAUTION

BEFORE THE FOLLOWING PROCEDURE IS INITIATED, THE PA MODULE MUST BE REMOVED FROM THE TRANSMITTER AND PLACED IN A SUITABLE WORKPLACE. NONE OF THE TRANSISTOR REPLACEMENT PROCEDURES SHOULD BE PERFORMED WHILE THE MODULE IS CONNECTED TO THE TRANSMITTER.

NOTE

If a failure has occurred in an PA module, the transistors must be replaced in pairs. Q1 and Q2, or Q3 and Q4, or Q5 and Q6, or Q7 and Q8 (Q1 -Q2 and Q3-Q4 in HT 250FM).

The RF devices used in this module are sold as Matched Pairs.

NOTE

Note the placement of the resistors located close to each matched pair of RF transistors. Remove resistors as necessary to gain access to transistors to be removed. Also, one end of inductors L3, L4, L5, and L6, can be lifted to gain easier access.

- a. Before removing transistor, note orientation of leads and body to ensure you can install the new transistor properly.
- b. With a modified cutting tool (Harris P/N 929 9326 001) cut the leads of the transistor adjacent to the ceramic cap of the transistor.
- c. Remove the screws holding the transistor to the heat sink and remove the transistor.
- d. Hold the transistor leads remaining on the pc board with needle nose pliers and remove the leads with a soldering iron.

NOTE

Use a soldering iron of sufficient wattage to remove the leads, but do not overheat or damage to the pc board will result.

5.9. Procedure to Mount New Transistors to PA Module

- a. Clean and inspect transistor position on the heat sink to ensure heat sink area where transistor mounts is flat and even.
- b. Brush on a thin, even film of heat sink compound (Harris P/N 555 0100 005) where the transistor is to be placed on the heat sink. Do not put compound on the screw holes in heat sink.
- c. Wipe on a thin, even layer of heat sink compound on the bottom of the transistor flange that mounts to the heat sink.
- d. Place the transistor on the heat sink. Ensure that body and leads are oriented properly as noted previously in transistor removal procedure.
- e. Insert two screws into transistor mounting holes and into heat sink. Alternately turn the two screws in the transistor flange clockwise; using only minimal pressure until both screws are snug. Final torque for the two screws should be 6-inch-lbs.
- f. Use a torque screwdriver for this operation to ensure proper transistor to heat sink heat transfer.
- g. Using a constant temperature 65-watt soldering iron, solder the tabs of the transistor to the proper positions on the pc board. Use only enough heat to flow the solder over the transistor leads.
- h. Replace any resistors or inductors that were removed.
- i. Remove excess solder flux from the transistors and resistors by brushing with a suitable flux remover available in electronic supply houses.
- j. Reinstall module in transmitter. Bring up drive level slowly and check for proper operation of the PA.

TROUBLESHOOTING PROCEDURES

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Transmitter will not power up.	<ol style="list-style-type: none"> 1. No primary voltage to terminal board TB1. 2. No +15 or -15 power on the Controller board. 2. Contactor will not operate. 	<ol style="list-style-type: none"> 1. Check Station circuit breakers. 2. Check the Controller fuse. 2. Check contactor plug at J8 check fuses in AC Distribution assy.
No RF Output	<ol style="list-style-type: none"> 1. No drive to the PA. 2. No Exciter output. 3. No 50 volt PA voltage. 	<ol style="list-style-type: none"> 1. Check the Splitter voltages. Correct as necessary. 2. Check Exciter output. Correct as necessary. 3. Check PA supply. Repair as necessary.
Cannot adjust RF Power output.	<ol style="list-style-type: none"> 1. Defective circuit on Controller printed-circuit board. 	<ol style="list-style-type: none"> 1. Troubleshoot the Controller printed-circuit board. Repair or replace as necessary.
No air output from the air exhaust	<ol style="list-style-type: none"> 2. Blower air inlet obstructed. 3. Defective blower motor. 4. Intermittent Fail-Safe system. 	<ol style="list-style-type: none"> 2. Clear obstruction from blower inlet. 3. Replace blower motor B4. 4. Check for poor STL or faulty remote control path. Correct as necessary.
PA Voltage too high (PA E Meter over 51V).	Defective voltage regulator assembly. Check regulator.	Repair as necessary.
PA FAULT LED blinking.	Defective reject load resistor.	Replace load resistor.
Over temperature on one PA module	Air blocked	Clean filter
	Fan defective	Replace as necessary
Reject load fault	Defective PA	Locate and replace unequal or missing Drive signal troubleshoot and replace.
	Defective reject load voltage sensor	Replace combiner
Sudden rise in output power	Open or shorted directional coupler cable	Locate and replace.
	Defective FWD Pwr sensor.	Locate and replace.
VSWR fault remains on	<ol style="list-style-type: none"> 1. Output line to the Antenna either shorted or open. 	<ol style="list-style-type: none"> 1. Reduce power and check Antenna VSWR and transmission line. Correct the defect.

888-2312-001

WARNING: Disconnect primary power prior to servicing.

5-5

TROUBLESHOOTING PROCEDURES

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
	2. Antenna damaged due to objects striking the Antenna or from weather damage.	2. Repair the antenna.
Contactor does not pull up.	1. Fuse F2 open 2. Coil of contactor 16 open.	1. Replace F2 2. Replace contactor K1.
Auto Power Set drifts.	1. Defective forward power coupler. 2. Auto Power circuit on Controller board.	1. replace the FORWARD Directional Coupler 2. Refer to Controller Troubleshooting table for corrective action.
VSWR Foldback does not operate.	1. Defective reverse power Directional Coupler DC1.	1. If no voltage is present when a known VSWR is present, replace the reverse power coupler element.
Transmitter off frequency.	1. Exciter AFC drifting.	1. Refer to the Exciter Technical Manual.
High FM Noise.	1. RF from the antenna appearing in the program lines to the Exciter. 2. Poor transmitter and audio input equipment grounding. 3. Noise generated inside exciter.	1. Filter Carrier RF from program lines, limiter, and all other audio equipment. 2. Ground the equipment properly. 3. Troubleshoot exciter.
High AM Noise	1. Defective filtering in PA supply.	1. Check filter chokes and capacitors. Replace defective components.
High Audio Distortion	1. Defective Exciter. 2. Defective program lines and/or audio input equipment.	1. Refer to the Exciter Technical Manual for corrective action. Check the Exciter operation separate from the transmitter. 2. Check all audio input equipment and lines separately.
No modulation	1. No audio input to the Exciter. 2. Defective Exciter.	1. Check limiters, lines, STL, and station wiring to the Exciter. Repair as necessary. 2. Refer to the Exciter Technical Manual and restore Exciter operation as necessary.
Remote control functions and metering failure.	1. Remote control equipment faulty. 2. Controller inputs and outputs.	1. Refer to the Remote Control Equipment Technical Manuals. Check the operation of the equipment and repair as necessary. 2. Refer to Controller Troubleshooting Table and repair the Controller as necessary.

TROUBLESHOOTING PROCEDURES

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Apparent interference to a TV channel close to the RF Carrier 2nd Harmonic.	1. Overload of TV from FM carrier at the fundamental frequency. When TV input is overloaded, the TV input amplifier will develop power at twice the FM Carrier frequency.	1. Trap out the FM carrier at the input to the TV set.
Troubleshooting Controller		
POWER SUPPLY		
+20 VOLTS (Positive end of capacitor C42) missing or -20 VOLTS (Negative end of capacitor C43) missing.	1. Loose connector J2.	1. Check the connectors at both ends of the cable which connects J2 of the Controller printed-circuit board to the filter/connector in the rear wall of the Controller enclosure, and both ends of the Power cable to the Controller from the AC Distribution Panel.
+15 VOLTS (TP11) missing.	1. Regulator integrated circuit U1 "open". 2. Diode CR27 "open". 3. +15-VOLT circuit "shorted".	1. Replace integrated circuit U1. 2. Replace diode CR27. 3. Relieve the "shorted" condition.
+B VOLTS (TP15) missing.	1. +15 VOLTS missing 2. Diode CR40 "open".	1. Restore +15 Volts 2. Replace diode CR40.
-15 VOLTS (Anode end of diode CR7) missing.	1. Regulator integrated circuit U2 "open". 2. Diode CR35 "open". 3. -15 VOLT circuit "shorted".	1. Replace integrated circuit U2. 2. Replace diode CR35. 3. Relieve the "shorted" condition.
TRI-STATE CONTROL is in the "HIGH" state.	1. +15 VOLTS low or missing (including power failure). 2. Diode CR47 "open". 3. Integrated circuit U17A defective.	2. Replace diode CR47. 3. Replace integrated circuit U17.
POWER ENABLE is in the "LOW" state.	1. TRI-STATE CONTROL is in the "HIGH" state. 2. Integrated circuit U17B defective. 3. POWER ENABLE circuit "shorted".	1. Refer to the TRI-STATE CONTROL is in the "HIGH" state section on the discussed previously in this table. 2. Replace integrated circuit U17. 3. Relieve the short.
OPERATING CIRCUITS		
TX ON circuit does not start transmitter.	1. Failsafe interlock open.	1. Troubleshoot and repair.

888-2312-001

WARNING: Disconnect primary power prior to servicing.

5-7

TROUBLESHOOTING PROCEDURES

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
	2. TX OFF circuit is "stuck" (this may be the remote circuit if the transmitter LOCAL/REMOTE switch is set to the REMOTE position).	2. Check Local and Remote TX OFF switches. Repair or replace as necessary.
	3. Controller does not have power.	3. Check power source to the transmitter. Restore as necessary. Check cable connections to the Controller printed circuit board.
	4. Main transmitter power is off.	4. Activate transmitter power.
	5. Integrated circuit U10F is defective.	5. Replace integrated circuit U10.
	6. Integrated circuit U7A is defective.	6. Replace integrated circuit U7.
	7. Diode CR17 is "open".	7. Replace diode CR17.
Transmitter turns OFF when TX ON switch is released (circuit does not "latch").	1. Integrated circuit U7A is defective.	1. Replace integrated circuit U7.
TX OFF circuit does not operate.	1. Integrated circuit U10 is defective. 2. Integrated circuit U7A is defective.	1. Replace integrated circuit U10. 2. Replace integrated circuit U7.
TX OFF circuit will remain OFF only if the TX OFF switch is held depressed. When the TX OFF switch is released, the transmitter again turns "ON".	1. Integrated circuit U7A is defective.	1. Replace U7.
No AC RESTART after a power failure.	1. Capacitors C44, C50, or C51 defective. 2. Resistor R73 "open".	1. Replace defective capacitor. 2. Replace Resistor R73.
METERING CIRCUITS		
Incorrect readings in the multimeter in all switch positions.	1. MULTIMETER is defective. 2. MULTIMETER SELECTOR switch S3 is defective.	1. Check output of integrated circuit U4B pin 7. +12 volts produces full scale deflection. Replace meter if defective. 2. Replace MULTIMETER SELECTOR switch S3.
Incorrect readings on one or more (but not all) MULTIMETER SELECTOR Switch positions.	1. PA E position. 2. PA I position.	1. Check integrated circuit U6A with a high-impedance meter to ground. Gain from resistor R77 (either end) to U6A-1 is unity. 2. Check integrated circuit U6B with a high-impedance meter to ground. Gain from resistor R84 (either end) to U6B-7 is unity.

TROUBLESHOOTING PROCEDURES

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Incorrect readings on one or more of the remote metering circuits.	3. FWD PWR position.	3. Check integrated circuit U3A with a high-impedance meter to ground. Gain from R1-4/13 (either end) to U3A-1 is 11.
	4. SWR position.	4. Check integrated circuit U5A with a high-impedance meter to ground. Gain from resistor R1-3/14 (either end) to U5A-1 is 11.
	5. APC position.	5. Check integrated circuit U4B with a high-impedance meter to ground. With S5 in the APC OFF position, the gain from U4 pin 5 to U4 pin 7 is 9.3 .
	6. BAT TEST position.	6. Check that a battery is installed.
	1. Faulty control wiring.	1. Check remote control wiring for defects.

888-2312-001

WARNING: Disconnect primary power prior to servicing.

5-9

SECTION VI PARTS LIST

6.1. Introduction

This section provides a description, reference designator and part number for selected replaceable parts and assemblies required for proper maintenance of the FM BROADCAST TRANSMITTER. The Replaceable Parts Index table lists assemblies having replaceable parts and the page number on which the table is located. Identity of the assembly nomenclature in index table signifies the equipment level within the overall equipment configuration.

6.2. Replaceable Parts Service

Replacement parts are available 24 hours a day, seven days a week from the HARRIS Service Parts Department. Telephone 217/222-8200 to contact the service parts department or address correspondence to Service Parts Department, HARRIS CORPORATION, Broadcast Products Division, P.O. Box 4290, Quincy, Illinois 62305-4290, USA. The HARRIS factory may also be contacted through a FAX facility (217/222-7041) or a TELEX service (247319).

Replaceable Parts List Index

XMTR, HT-1FM RACKED - 994 9231 001 .....	.6-2
XMTR, HT-1FM LESS RACK - 994 9231 003 .....	.6-2
BASIC HT-1FM SS FM XMTR - 994 9231 002 .....	.6-2
CABLE PKG, HT1FM - 943 5135 030 .....	.6-2
COMBINER ASSY - 992 8118 002 .....	.6-3
SPLITTER/COMBINER ASSY - 992 8118 001 .....	.6-3
LOW PWR FM, 500W PA - 992 8236 001 .....	.6-3
CABLE PKG, 500W/250W - 943 5135 019 .....	.6-4
REGULATOR & DISPLAY BD - 992 8119 001 .....	.6-4
CONTROLLER, LOW PWR FM - 992 8240 001 .....	.6-6
CTRL CABLE PKG - 943 5135 017 .....	.6-6
INTERFACE BD - 992 8124 001 .....	.6-6
CONTROLLER BD - 992 8125 001 .....	.6-7
SPLITTER BD - 992 8118 003 .....	.6-9
AC DISTRIBUTION ASSY - 992 8123 001 .....	.6-9
CABLE PKG, AC DIST - 943 5135 020 .....	.6-9
MISC. PARTS, HT1FM - 992 8237 001 .....	.6-9
XMTR, HT 500FM RACKED - 994 9195 001 .....	.6-9
XMTR, HT 500FM LESS RACK - 994 9195 003 .....	.6-10
BASIC HT 500FM SS FM XMTR - 994 9195 002 .....	.6-10
LOW PWR FM, 500W PA - 992 8116 001 .....	.6-10
MISC. PARTS HT500FM - 992 8239 001 .....	.6-11
XMTR, HT-250FM RACKED - 994 9233 001 .....	.6-11
XMTR, HT250FM LESS RACK - 994 9233 003 .....	.6-12
BASIC HT-250FM SS FM XMTR - 994 9233 002 .....	.6-12
CABLE PKG, HT 250/500 FM - 943 5135 023 .....	.6-12
LOW PWR FM, 250W PA - 992 8115 001 .....	.6-13
MISC. PARTS, HT250FM - 992 8238 001 .....	.6-13

XMTR, HT-1FM RACKED - 994 9231 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
472 1675 000	. XFMR, PWR, 60HZ, FERRO	0 ..	T1 (2 REQ'D)
472 1676 000	. XFMR, PWR, 50HZ FERRO	0 ..	T1 (2 REQ'D)
740 1179 000	. AMP MODULE 700W,86-100MHZ	0 ..	3A1 4A1
989 0085 001	. PKG CK LIST LPFM RACKED	0 ..	
990 1098 001	. R-SC KIT HT 1FM	0 ..	
992 8118 002	. COMBINER ASSY	0 ..	A004
992 8236 001	. LOW PWR FM, 500W PA	0 ..	UNIT 3, UNIT 4
992 8240 001	. CONTROLLER, LOW PWR FM	0 ..	UNIT 1
994 9124 001	. FM EXCITER, THE-1	1 ..	UNIT 7
994 9222 001	. R-SP KIT HT 1FM	0 ..	
994 9223 001	. R-SB KIT HT 1FM	0 ..	
994 9231 002	. BASIC HT-1FM SS FM XMTR	1 ..	

XMTR, HT-1FM LESS RACK - 994 9231 003

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0473 000	. CORD, W/PLUG ASSY	1 ..	#UNIT 7
472 1675 000	. XFMR, PWR, 60HZ, FERRO	0 ..	T1 (2 REQ'D)
472 1676 000	. XFMR, PWR, 50HZ FERRO	0 ..	T1 (2 REQ'D)
484 0385 000	. FILTER, LOWPASS, 1200W FM	1 ..	FL002
620 0122 000	. ADPTR ANGLE N UG27CU	1 ..	#FL2
620 2204 000	. CONN, 7/8 IN SW FLANGE	1 ..	#DC1
620 2564 000	. DIR. COUPLER, DUAL SOCKET	1 ..	DC001
620 2565 000	. ELEMENT 1KW	1 ..	#DC1
620 2566 000	. ELEMENT 100W	1 ..	#DC1
620 2581 000	. CONNECTOR, TYPE N MALE,	1 ..	#DC1
740 1179 000	. AMP MODULE 700W,86-100MHZ	0 ..	3A1 4A1
817 2130 007	. FILTER	2 ..	#UNIT 3, #UNIT 4,
943 5135 030	. CABLE PKG, HT1FM	1 ..	
989 0084 001	. PKG CK LIST LPFM LESSRACK	0 ..	
990 1098 001	. R-SC KIT HT 1FM	0 ..	
992 8118 001	. SPLITTER/COMBINER ASSY	1 ..	A003 A004
992 8118 002	. COMBINER ASSY	0 ..	A004
992 8123 001	. AC DISTRIBUTION ASSY	1 ..	UNIT 6
992 8236 001	. LOW PWR FM, 500W PA	0 ..	UNIT 3, UNIT 4
992 8240 001	. CONTROLLER, LOW PWR FM	1 ..	UNIT 1
994 9124 001	. FM EXCITER, THE-1	1 ..	UNIT 7
994 9222 001	. R-SP KIT HT 1FM	0 ..	
994 9223 001	. R-SB KIT HT 1FM	0 ..	

BASIC HT-1FM SS FM XMTR - 994 9231 002

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
943 5135 030	. CABLE PKG, HT1FM	1 ..	
992 8118 001	. SPLITTER/COMBINER ASSY	1 ..	A003 A004
992 8123 001	. AC DISTRIBUTION ASSY	1 ..	UNIT 6
992 8142 001	. CABINET RAK 80B LPFM	1 ..	UNIT 8
992 8236 001	. LOW PWR FM, 500W PA	2 ..	UNIT 3, UNIT 4
992 8237 001	. MISC. PARTS, HT1FM	1 ..	
992 8240 001	. CONTROLLER, LOW PWR FM	1 ..	UNIT 1

CABLE PKG, HT1FM - 943 5135 030

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
253 0074 000	. CABLE, 4C 22AWG SHLD	8 ..	.FT
252 0002 000	. WIRE, STRD 22AWG GRN	4 ..	.FT
252 0008 000	. WIRE, STRD 10AWG GRY	12 ..	.FT

354 0324 000	. LUG #10 RING YEL 12-10AWG ... 8 .
354 0613 000	. CONTACT SOCKET 26-18 AWG .. 2 .
354 0729 000	. CONTACT, SOCKET 30-26 AWG .. 8 .
354 0730 000	. CONTACT, PIN 24-20 AWG 8 .
610 0912 000	. HOUSING, PLUG 6 CKT 2 .
612 0856 000	. SOCKET HOUSING 2 CKT 1 .
612 1143 000	. HOUSING, RECEPT 6 CKT 2 .
618 0051 000	. COAX CABLE RG58C U 19 FT
618 0188 000	. COAX CABLE RG213/U 6 . FT
620 1948 000	. PLUG, STRAIGHT TYPE N 4 .
620 1951 000	. STRAIGHT PLUG BNC CRIMP ... 8 .

COMBINER ASSY - 992 8118 002

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
354 0309 000	. TERM SOLDER	2 .	E001 E002
384 0205 000	. DIODE SILICON 1N914/4148	1 .	CR001
516 0530 000	. CAP 0.01UF 100V 20%	1 .	C001
540 0033 000	. RES 220.0 OHM 1/2W 5%	1 .	R002
544 1634 000	. RES 100.0 OHM 250W 5%	1 .	R001
612 0233 000	. RECEPTACLE N UG-58A/U	2 .	J001 J002
618 0711 000	. COAX CABLE RG 302/U	4 . FT	
620 2581 000	. CONNECTOR, TYPE N MALE, ...	1 .	J003
822 0975 007	. COMBINER HS	1 .	
843 5135 016	. PWB, SPLITTER/COMB	1 .	
922 0975 023	. TRANSFORMER	1 .	T001

SPLITTER/COMBINER ASSY - 992 8118 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
354 0309 000	. TERM SOLDER	2 .	A4E1 A4E2
384 0205 000	. DIODE SILICON 1N914/4148	1 .	A4CR1
516 0530 000	. CAP 0.01UF 100V 20%	1 .	A4C1
540 0033 000	. RES 220.0 OHM 1/2W 5%	1 .	A4R2
544 1634 000	. RES 100.0 OHM 250W 5%	2 .	A3R1 A4R1
612 0233 000	. RECEPTACLE N UG-58A/U	2 .	A4J1 A4J2
618 0618 000	. COAX CABLE RG179B/U	4 . FT	#A003
618 0711 000	. COAX CABLE RG 302/U	4 . FT	#A004
620 1677 000	. RECEPTACLE, PC MT, BNC	3 .	A3J009 A3J010 A3J011
620 2581 000	. CONNECTOR, TYPE N MALE, ...	1 .	A4J3
822 0975 007	. COMBINER HS	1 .	#A004
843 5135 016	. PWB, SPLITTER/COMB	1 .	
922 0975 023	. TRANSFORMER	1 .	A4T1

LOW PWR FM, 500W PA - 992 8236 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0086 000	. CORD, W/PLUG ASSY	1 .	#B001
250 0474 000	. CORD W/PLUG ASSY	1 .	#FL001
357 0089 000	. GUIDE, MODULE	2 .	
358 0002 000	. BRACKET RESISTOR MTG	4 .	#R001 #R002
358 1971 000	. BUSHING SR7W-2	1 .	#FL001
358 2996 000	. END PLATE, 262 TERM BD	1 .	#TB001
358 3121 000	. STUD, BRS 10-32 X 1	3 .	#C004 #C005 #E001
380 0716 000	. TRANSISTOR 2N5684	4 .	Q001 Q002 Q003 Q004
384 0761 000	. BRIDGE RECT 100A	1 .	CR001
410 0391 000	. INSULATOR TRANSISTOR T03 ...	4 .	#Q001 #Q002 #Q003 #Q004
430 0205 000	. FAN 230VAC 260CFM	1 .	B001
442 0108 000	. SW, THMOSTAT OPEN 85 DEG C .	1 .	S001

476 0415 000	. CH, 0.4MH 30A	1 ..	L001
484 0370 000	. FILTER AC LINE 120/250VAC	1 ..	FL001
526 0376 000	. CAP 10UF 660V	2 ..	C001 C002
526 0377 000	. CAP 42000UF 60V -10/+75%	2 ..	C004 C005
530 0090 000	. BRACKET, CAP. 2.5" ID	2 ..	#C004 #C005
540 0623 000	. RES 3.3K OHM 2W 5%	1 ..	R003
542 0169 000	. RES 25.0 OHM 25W	1 ..	R002
542 0208 000	. RES 100.0 OHM 50W	1 ..	R001
606 0806 000	. CB 15A 2P 250VAC 50/60HZ	1 ..	CB001
614 0788 000	. TERM BD, 2C MODULAR 262	2 ..	#TB001
614 0789 000	. TERM BD, 4C MODULAR 262	2 ..	#TB001
620 0122 000	. ADPTR ANGLE N UG27CU	1 ..	A1J2
740 1179 000	. AMP MODULE 700W,86-100MHZ ..	1 ..	
817 2130 007	. FILTER	1 ..	
817 2130 008	. CHASSIS LATCH	1 ..	
822 0975 024	. TERMINAL COVER PLT	1 ..	
839 7909 017	. PA PWR SUPPLY HS	1 ..	
922 0446 060	. SOCKET, TRANSISTOR	4 ..	#Q001 #Q002 #Q003 #Q004
943 5135 019	. CABLE PKG, 500W/250W	1 ..	
992 8119 001	. REGULATOR & DISPLAY BD	1 ..	A002

CABLE PKG, 500W/250W - 943 5135 019

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
252 0008 000	. WIRE, STRD 10AWG GRY	14.2FT	
354 0028 000	. TERM LUG YEL SPADE 6	2 ..	
354 0023 000	. LUG #6 RING YEL 12-10AWG	2 ..	
253 0074 000	. CABLE, 4C 22AWG SHLD	3.5 .FT	
252 0004 000	. WIRE, STRD 18AWG RED	9.1 .FT	
252 0006 000	. WIRE, STRD 14AWG BLU	15.2FT	
252 0002 000	. WIRE, STRD 22AWG GRN	9.5 .FT	
354 0001 000	. LUG #6 RING RED 22-18 AWG	4 ..	
354 0003 000	. LUG #10 RING RED 22-18AWG	1 ..	
354 0005 000	. TERM LUG RED SPADE 6	1 ..	
354 0010 000	. LUG #10 RING BLU 16-14AWG	3 ..	
354 0324 000	. LUG #10 RING YEL 12-10AWG	4 ..	
354 0730 000	. CONTACT, PIN 24-20 AWG	4 ..	
354 0765 000	. TERM FOR .250 X .032 TAB	4 ..	
612 1143 000	. HOUSING, RECEPT 6 CKT	1 ..	P001
612 1162 000	. HOUSING 6 CKT	3 ..	J002 J003 J005
612 1287 000	. HOUSING,10 PIN RECEPTACLE ..	1 ..	J001
618 0051 000	. COAX CABLE RG58C U	3 ..FT	
620 1959 000	. PLUG BNC RIGHT ANGLE	1 ..	
620 1962 000	. JACK, BNC BULKHEAD	1 ..	
354 0767 000	. TERM FOR .250 X .032 TAB	7 ..	
354 0669 000	. TERM 250 FEM RED 22-18	2 ..	
354 0026 000	. LUG YEL SPADE 10	2 ..	
354 0771 000	. TERM FOR .020 X .110 TAB	2 ..	
354 0744 000	. RECEPTACLE CONT 18-22 AWG ..	7 ..	

REGULATOR & DISPLAY BD - 992 8119 001

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
380 0189 000	. XSTR, 2N3904	3 ..	Q007 Q008 Q009
380 0190 000	. XSTR, 2N3906	1 ..	Q005
380 0191 000	. XSTR, MJE371	1 ..	Q006
380 0192 000	. XSTR, MJE521	1 ..	Q010
382 0379 000	. IC, 723	1 ..	U001

382 0406 000	. IC, MC7812CT	1	U004
382 0428 000	. IC, LM358	1	U002
382 0719 000	. IC LM324AN	1	U003
384 0205 000	. DIODE SILICON 1N914/4148	5	CR005 CR007 CR008 CR009 CR011
384 0341 000	. RECTIFIER 1N5404	1	CR001
384 0610 000	. LED, GREEN	1	DS001
384 0611 000	. LED, RED	1	DS002
386 0062 000	. ZENER, 1N4753 36V	1	CR003
386 0092 000	. ZENER, 1N4744 15V	1	CR012
386 0135 000	. ZENER, 1N4733A 5.1V	1	CR010
386 0138 000	. ZENER, 1N4750A 27V	1	CR002
404 0673 000	. SOCKET 8 PIN DIP (DL)	1	XU002
404 0674 000	. SOCKET 14 PIN DIP (D-L)	2	XU001 XU003
506 0232 000	. CAP .01UF 100V 5%	5	C003 C007 C008 C009 C016
506 0243 000	. CAP .15UF 63V 5%	1	C024
516 0453 000	. CAP .1UF 100V 20%	9	C002 C004 C006 C011 C018 C019 C020 C021 C022
516 0778 000	. CAP 120PF 50V 10%	1	C005
516 0859 000	. CAP 470PF 50V 10%	1	C023
522 0548 000	. CAP 10UF 50V ELECTROLYTIC	4	C013 C014 C017 C025
522 0566 000	. CAP 100UF 63V 20%	1	C010
526 0097 000	. CAP 47 UF 35V 20%	1	C012
540 0053 000	. RES 1.5K OHM 1/2W 5%	2	R015 R037
540 0338 000	. RES 1.8K OHM 1W 5%	1	R026
540 0343 000	. RES 3.0K OHM 1W 5%	2	R048 R049
540 0888 000	. RES 100.0 OHM 1/4W 5%	8	R010 R012 R014 R023 R027 R030 R033 R050
540 0896 000	. RES 220.0 OHM 1/4W 5%	1	R021
540 0912 000	. RES 1.0K OHM 1/4W 5%	8	R018 R019 R020 R025 R031 R039 R061 R062
540 0920 000	. RES 2.2K OHM 1/4W 5%	1	R028
540 0928 000	. RES 4.7K OHM 1/4W 5%	1	R024
540 0932 000	. RES 6.8K OHM 1/4W 5%	1	R032
540 0936 000	. RES 10.0K OHM 1/4W 5%	10	R029 R038 R040 R041 R042 R043 R044 R045 R046 R047
540 0964 000	. RES 150K OHM 1/4W 5%	1	R051
540 0983 000	. RES 910.0K OHM 1/4W 5%	1	R052
548 0254 000	. RES 49.9K OHM .125W 1%	6	R001 R003 R016 R034 R055 R056
548 0256 000	. RES 4.99K OHM 1/8W 1%	1	R017
548 0292 000	. RES 10K OHM 1/8W 1%	4	R002 R004 R053 R054
548 0318 000	. RES 1000 OHM 1/4W 1%	2	R007 R008
548 1212 000	. RES 7500 OHM 1/4W 1%	1	R035
548 1225 000	. RES 9530 OHM 1/8W 1%	1	R005
548 1487 000	. RES 0.1 OHM 10W 1%	4	R009 R011 R013 R022
550 0923 000	. POT 1K OHM 1/2W	2	R006 R060
550 0927 000	. POT 2K OHM 1/2W	1	R036
610 0933 000	. JUMPER, PWB TEST POINT	9	TP004 TP005 TP006 TP007 TP008 TP009 TP010 TP011 TP012
610 0999 000	. HDR, 10 PIN, PC BD	1	J001
610 1046 000	. HEADER 6 COND PC MOUNT	3	J002 J003 J005
610 1066 000	. CONN, .25 FASTON PC MOUNT	2	J006 J007
612 0693 000	. TEST JACK	3	TP001 TP002 TP003
839 7909 016	. SCHEM, REGULATOR	0	

888-2312-002

WARNING: Disconnect primary power prior to servicing.

6-5

CONTROLLER, LOW PWR FM - 992 8240 001

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
357 0089 000	. GUIDE, MODULE	2	
398 0045 000	. FUSE,SLOW CART .250A 250V	1	F001
484 0296 000	. FILTER RFI POWER LINE	1	FL001
598 0222 000	. MODULE, ESCUTCHEON	6	
620 0547 000	. ADAPTER BNC TO N UG201A/U	1	#FLEX PATCH
632 1149 000	. MULTIMETER, 3-1/2"	1	M001
822 0849 008	. HANDLE	2	
822 0849 010	. EXTENDED NUT	2	
943 5135 017	. CTRL CABLE PKG	1	
992 8124 001	. INTERFACE BD	1	A002
992 8125 001	. CONTROLLER BD	1	A001

CTRL CABLE PKG - 943 5135 017

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
250 0271 000	. CABLE, RIBBON 34C 28AWG	1.6	.FT
354 0790 000	. TERMINAL,FEMALE 20-14 AWG	4	
612 1015 000	. CONN, FEMALE 34 POS	2	
612 1326 000	. HOUSING, 4 PIN CONN PLUG	1	
354 0613 000	. CONTACT SOCKET 26-18 AWG	6	
354 0003 000	. LUG #10 RING RED 22-18AWG	2	
252 0004 000	. WIRE, STRD 18AWG RED	5.7	.FT

INTERFACE BD - 992 8124 001

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
358 2997 000	. END PLATE,236 TERM MODULE	1	
384 0431 000	. RECT. 1N4001	1	CR028
384 0720 000	. DIODE, 15V ICTE-15	27	CR001 CR002 CR003 CR004 CR005 CR006 CR007 CR008 CR009 CR010 CR011 CR012 CR013 CR014 CR015 CR016 CR017 CR018 CR019 CR020 CR021 CR022 CR023 CR024 CR025 CR026 CR027
494 0218 000	. CHOKE WIDE BAND	27	L001 L002 L003 L004 L005 L006 L007 L008 L009 L010 L011 L012 L013 L014 L015 L016 L017 L018 L019 L020 L021 L022 L023 L024 L025 L026 L027
516 0530 000	. CAP 0.01UF 100V 20%	3	C028 C029 C030
516 0777 000	. CAP 100PF 50V 10% COG	27	C001 C002 C003 C004 C005 C006 C007 C008 C009 C010 C011 C012 C013 C014 C015 C016 C017 C018 C019 C020 C021 C022 C023 C024 C025 C026 C027
574 0472 000	. RELAY, 12VDC 8A PC MT	1	
610 0718 000	. HEADER 2 PIN	1	J008
610 0719 000	. HEADER 3 PIN	1	J006
610 0984 000	. HDR, 34 PIN PC RBN	1	J001
612 1129 000	. SOCKET HEADER 6 POS PC MT	3	J002 J003 J004
612 1328 000	. SOCKET HEADER 4 POS PC MT	1	J005
614 0790 000	. TERM MODULE,1C PC MTG 236	20	
620 1677 000	. RECEPTACLE, PC MT, BNC	1	J007
839 7909 005	. SCHEM, I/O	0	

CONTROLLER BD - 992 8125 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0448 000	. CABLE, 6C 22AWG 5 IN LG	1	P005
358 2144 000	. BRACKET, XFMR MTG	1	#T001
358 2177 000	. SPACER, LED MOUNT .380 LG	9	#DS001 #DS002 #DS003 #DS004 #DS005 #DS006 #DS007 #DS008 #DS009
358 2836 000	. BATTERY HOLDER 9 VOLT	1	XBT1
380 0189 000	. XSTR, 2N3904	6	Q001 Q002 Q004 Q005 Q007 Q008
382 0359 000	. IC, 7815	1	U001
382 0360 000	. IC, 7915	1	U002
382 0419 000	. IC, 74C14 ESD	1	U017
382 0428 000	. IC, LM358	4	U003 U004 U005 U006
382 0465 000	. IC, 74C74 ESD	1	U007
382 0498 000	. IC, 74C20 ESD	1	U020
382 0593 000	. IC, TL072ACP	1	U011
382 0646 000	. IC, 0808 ESD	1	U031
382 1014 000	. IC, 74C193/40193 ESD	2	U021 U027
382 1015 000	. IC, CD4048B ESD	2	U029 U030
382 1016 000	. IC, MM74C240N ESD	1	U010
382 1017 000	. IC, MM74C244N ESD	1	U028
382 1070 000	. IC, ILQ-1 OPTO-ISOLATOR	2	U008 U009
384 0020 000	. RECTIFIER IN4005	4	CR043 CR044 CR045 CR046
384 0205 000	. DIODE SILICON 1N914/4148	18	CR001 CR002 CR003 CR006 CR008 CR009 CR010 CR011 CR012 CR013 CR014 CR015 CR016 CR017 CR018 CR019 CR023 CR024 CR026 CR027 CR030 CR035 CR040
384 0431 000	. RECT. 1N4001	5	DS002 DS005 DS006
384 0610 000	. LED, GREEN	3	DS001 DS003 DS004 DS007 DS008 DS009
384 0611 000	. LED, RED	6	CR025 CR032 CR033
384 0720 000	. DIODE, 15V ICTE-15	3	CR042
384 0805 000	. RECT, 1N5391 50V	1	CR036 CR037
384 0838 000	. DIODE, 36V ICTE-36	2	CR004
386 0085 000	. ZENER, 1N4740A 10V	1	CR005 CR038 CR039
386 0135 000	. ZENER, 1N4733A 5.1V	3	CR047
386 0300 000	. ZENER, 1N4730A 3.9V	1	XU003 XU004 XU005 XU006 XU011 XU007 XU017 XU020
404 0673 000	. SOCKET 8 PIN DIP (DL)	5	XU008 XU009 XU021 XU027 XU029 XU030 XU031
404 0674 000	. SOCKET 14 PIN DIP (D-L)	3	#U001
404 0675 000	. SOCKET IC 16 CONT	7	XU010 XU028
404 0685 000	. HEAT SINK	1	T001
404 0704 000	. SOCKET IC 20 PIN	2	C049
472 1186 000	. XFMR, PWR, DPC28-800	1	C003 C004 C005 C012 C013 C014 C015 C016 C017 C018 C019 C020 C021 C022 C023 C024 C025 C026 C027 C028 C029 C030 C031 C032 C033 C034 C035 C036 C037 C041
506 0244 000	. CAP .22UF 63V 5%	1	C001 C002 C038 C040
516 0453 000	. CAP .1UF 100V 20%	30	C042 C043
516 0530 000	. CAP 0.01UF 100V 20%	4	C007 C008 C052
522 0547 000	. CAP 3300UF 40V-10%, +50%	2	C009 C010
522 0548 000	. CAP 10UF 50V ELECTROLYTIC	3	C006 C039
522 0570 000	. CAP 2.2UF 50V	2	C011
526 0050 000	. CAP 1UF 35V 20%	2	C044 C050 C051
526 0238 000	. CAP 33UF 35V 20%	1	R026
526 0374 000	. CAP 1.0F 5V	3	R039 R050 R074
540 0018 000	. RES 51.0 OHM 1/2W 5%	1	
540 0025 000	. RES 100 OHM 1/2W 5%	3	

888-2312-002

WARNING: Disconnect primary power prior to servicing.

540 0052 000	. RES 1.3K OHM 1/2W 5%	..... 8 ..	R007 R027 R037 R040 R041 R047 R049 R051
540 0056 000	. RES 2.0K OHM 1/2W 5%	..... 2 ..	R057 R058
540 0308 000	. RES 100.0 OHM 1W 5%	..... 1 ..	R073
540 0900 000	. RES 330.0 OHM 1/4W 5%	..... 1 ..	R075
540 0906 000	. RES 560.0 OHM 1/4W 5%	..... 1 ..	R060
540 0912 000	. RES 1.0K OHM 1/4W 5%	..... 8 ..	R061 R069 R077 R078 R079 R081 R082 R083
540 0914 000	. RES 1.2K OHM 1/4W 5%	..... 1 ..	R035
540 0919 000	. RES 2.0K OHM 1/4W 5%	..... 1 ..	R052
540 0920 000	. RES 2.2K OHM 1/4W 5%	..... 1 ..	R043
540 0928 000	. RES 4.7K OHM 1/4W 5%	..... 2 ..	R011 R048
540 0933 000	. RES 7.5K OHM 1/4W 5%	..... 5 ..	R015 R033 R034 R067 R068
540 0936 000	. RES 10.0K OHM 1/4W 5%	..... 6 ..	R021 R030 R065 R066 R071 R080
540 0938 000	. RES 12.0K OHM 1/4W 5%	..... 1 ..	R076
540 0940 000	. RES 15.0K OHM 1/4W 5%	..... 1 ..	R018
540 0941 000	. RES 16.0K OHM 1/4W 5%	..... 1 ..	R022
540 0944 000	. RES 22.0K OHM 1/4W 5%	..... 1 ..	R036
540 0950 000	. RES 39.0K OHM 1/4W 5%	..... 1 ..	R010
540 0954 000	. RES 56.0K OHM 1/4W 5%	..... 1 ..	R070
540 0960 000	. RES 100.0K OHM 1/4W 5%	..... 12 ..	R004 R005 R013 R014 R031 R032 R042 R044 R045 R046 R053 R059
540 0976 000	. RES 470.0K OHM 1/4W 5%	..... 2 ..	R006 R086
540 0984 000	. RES 1.0M OHM 1/4W 5%	..... 2 ..	R008 R017
540 0991 000	. RES 2.0M OHM 1/4W 5%	..... 1 ..	R029
540 0994 000	. RES 2.7M OHM 1/4W 5%	..... 1 ..	R012
540 1000 000	. RES 4.7M OHM 1/4W 5%	..... 1 ..	R084
540 1000 000	. RES 10.0M OHM 1/4W 5%	..... 1 ..	R085
540 1356 000	. RES NETWORK 10K OHM 2%	... 3 ..	R002 R003 R055
540 1357 000	. RES NETWORK 1000 OHM 2%	... 2 ..	R001 R025
540 1366 000	. RES NETWORK 100 OHM 2%	... 1 ..	R024
540 1367 000	. RES NETWORK 2000 OHM 2%	... 1 ..	R023
548 0537 000	. RES 30.1K OHM 1/8W 1%	..... 1 ..	R072
548 1347 000	. RES 2.37K OHM 1/8W	..... 1 ..	R062
548 2067 000	. RES 5360 OHM 1/4W 1%	..... 1 ..	R054
548 2162 000	. RES 39.2K OHM 1/4W 1%	..... 1 ..	R056
550 0914 000	. POT, 10K OHM	..... 5 ..	R016 R019 R020 R028 R038
550 0939 000	. POT 100K OHM 1/2W	..... 1 ..	R063
550 1069 000	. POT 5K OHM 1/2W	..... 2 ..	R009 R064
560 0060 000	. MOV 250A 2.5J - 40 VAC	..... 1 ..	RV-1
604 0859 000	. SW, TGL DPDT	..... 1 ..	S005
604 0903 000	. SWITCH, TGL SPDT MOM OFF	.. 1 ..	S001
604 0904 000	. SW, TGL SPDT	..... 2 ..	S002 S004
604 1109 000	. SWITCH ON OFF MOM	..... 1 ..	S003
604 1110 000	. SWITCH, PB-6 POSITION	..... 1 ..	S007
610 0900 000	. HEADER 3 CKT STRAIGHT	..... 1 ..	J010
610 0933 000	. JUMPER, PWB TEST POINT	..... 21 ..	TP001 TP002 TP003 TP004 TP005 TP006 TP007 TP008 TP009 TP010 TP011 TP012 TP013 TP014 TP015 TP016 TP017 TP020 TP021 TP022 TP023
610 0984 000	. HDR, 34 PIN PC RBN	..... 1 ..	J001
610 1046 000	. HEADER 6 COND PC MOUNT	... 1 ..	J005
610 1075 000	. JUMPER FLEX 16-C-26 AWG	.... 1 ..	J004
610 1098 000	. HDR, 4 PIN IN-LINE	..... 1 ..	J002
612 1184 000	. JUMPER .1" CENTERS	..... 1 ..	XJ010
839 7909 004	. SCHEM, CONTROLLER	..... 0 ..	

SPLITTER BD - 992 8118 003

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
544 1634 000	. RES 100.0 OHM 250W 5%	1 .	R001
618 0618 000	. COAX CABLE RG179B/U	4 .	FT
620 1677 000	. RECEPTACLE, PC MT, BNC	3 .	J009 J010 J011

AC DISTRIBUTION ASSY - 992 8123 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
055 0120 509	. CONNECTOR 3/8 IN	1 .	
358 1772 000	. BUSHING SR-5P-4	1 .	
358 1971 000	. BUSHING SR7W-2	1 .	
358 3123 000	. STUD, BRS 10-32 X 1-1/2	1 .	#E001
398 0054 000	. FUSE, SLOW CART 1A 250V	2 .	F001 F002
402 0023 000	. FUSE HOLDER, 342004	2 .	XF001 XF002
560 0055 000	. MOV 4500A 70J 250VAC	4 .	RV001 RV002 RV003 RV004
570 0132 000	. CNTOR 30A 208/220V 3P	1 .	K001
612 1329 000	. RECEPTACLE, DUPLEX	2 .	J001 J002
614 0274 000	. TERM BD 3 TERM	1 .	TB001
646 0665 000	. INSPECTION LABEL	1 .	
843 5135 010	. AC COVER	1 .	
939 7909 019	. AC BASE PLATE	1 .	
943 5135 020	. CABLE PKG, AC DIST	1 .	

CABLE PKG, AC DIST - 943 5135 020

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0473 000	. CORD, W/PLUG ASSY	1 .	
252 0006 000	. WIRE, STRD 14AWG BLU	15.6 FT	
354 0008 000	. LUG #6 RING BLUE 16-14AWG ...	2 .	
354 0010 000	. LUG #10 RING BLU 16-14AWG ...	1 .	
354 0613 000	. CONTACT SOCKET 26-18 AWG ..	2 .	
612 0857 000	. SOCKET HOUSING 3 CKT	1 .	
354 0017 000	. LUG BLUE SPADE 10	7 .	
354 0003 000	. LUG #10 RING RED 22-18AWG ...	1 .	

MISC. PARTS, HT1FM - 992 8237 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0473 000	. CORD, W/PLUG ASSY	1 .	#UNIT 7
484 0385 000	. FILTER, LOWPASS, 1200W FM ...	1 .	FL002
620 0122 000	. ADPTR ANGLE N UG27CU	1 .	#FL2
620 2204 000	. CONN, 7/8 IN SW FLANGE	1 .	#DC1
620 2564 000	. DIR. COUPLER, DUAL SOCKET ...	1 .	DC001
620 2565 000	. ELEMENT 1KW	1 .	#DC1
620 2566 000	. ELEMENT 100W	1 .	#DC1
620 2581 000	. CONNECTOR, TYPE N MALE, ...	1 .	#DC1
817 2130 007	. FILTER	2 .	#UNIT 3, #UNIT 4
831 5483 003	. PANEL, BLANK 1-3/4 IN.	1 .	
831 5483 027	. PANEL, BLANK 7 IN.	5 .	
606 0806 000	. CB 15A 2P 250VAC 50/60HZ	2 .	#PACB1
740 1179 000	. AMP MODULE 700W, 86-108MHZ .	2 .	#PA

XMTR, HT 500FM RACKED - 994 9195 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
472 1675 000	. XFMR, PWR, 60HZ, FERRO	0 .	T1 (1 REQ'D)
472 1676 000	. XFMR, PWR, 50HZ FERRO	0 .	T1 (1 REQ'D)
740 1110 000	. AMP MODULE 700W,86-108MHZ ..	0 .	3A1
839 7909 033	. CABINET OUTLINE, HT 500FM ...	0 .	

888-2312-002

WARNING: Disconnect primary power prior to servicing.

843 5135 025	. SCHEM, OVERALL, HT500FM	.... 0 ..	
989 0085 001	. PKG CK LIST LPFM RACKED	.... 0 ..	
990 1097 001	. R-SC KIT HT 500FM	..... 0 ..	
992 8116 001	. LOW PWR FM, 500W PA	..... 0 ..	UNIT 3
992 8240 001	. CONTROLLER, LOW PWR FM	... 0 ..	UNIT 1
994 9124 001	. FM EXCITER, THE-1	..... 1 ..	UNIT 7
994 9195 002	. BASIC HT 500FM SS FM XMTR	... 1 ..	
994 9220 001	. R-SP KIT HT 500FM	..... 0 ..	
994 9221 001	. R-SB KIT HT 500FM	..... 0 ..	

XMTR, HT 500FM LESS RACK - 994 9195 003

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0473 000	. CORD, W/PLUG ASSY	..... 1 ..	#UNIT 7
424 0100 000	. BUMPER .8125 SQ	..... 4 ..	
472 1675 000	. XFMR, PWR, 60HZ, FERRO	..... 0 ..	T1 (REQ'D)
472 1676 000	. XFMR, PWR, 50HZ FERRO	..... 0 ..	T1 (1REQ'D)
484 0385 000	. FILTER, LOWPASS, 1200W FM	... 1 ..	FL002
620 0122 000	. ADPTR ANGLE N UG27CU	..... 1 ..	#FL2
620 2548 000	. RECP, FEMALE N PANEL	..... 1 ..	#DC1
620 2564 000	. DIR. COUPLER, DUAL SOCKET	.. 1 ..	DC001
620 2574 000	. ELEMENT 500W	..... 1 ..	#DC1
620 2576 000	. ELEMENT 50W	..... 1 ..	#DC1
620 2581 000	. CONNECTOR, TYPE N MALE,	... 1 ..	#DC1
740 1110 000	. AMP MODULE 700W,86-108MHZ	.. 0 ..	3A1
817 2130 007	. FILTER	..... 1 ..	#UNIT 3
839 7909 034	. CABINET OUTLINE, HT 500FM	... 0 ..	
843 5135 025	. SCHEM, OVERALL, HT500FM	.... 0 ..	
943 5135 023	. CABLE PKG, HT 250/500 FM	.... 1 ..	
989 0084 001	. PKG CK LIST LPFM LESSRACK	.. 0 ..	
990 1097 001	. R-SC KIT HT 500FM	..... 0 ..	
992 8116 001	. LOW PWR FM, 500W PA	..... 1 ..	UNIT 3
992 8123 001	. AC DISTRIBUTION ASSY	..... 1 ..	UNIT 6
992 8240 001	. CONTROLLER, LOW PWR FM	... 1 ..	UNIT 1
994 9124 001	. FM EXCITER, THE-1	..... 1 ..	UNIT 7
994 9220 001	. R-SP KIT HT 500FM	..... 0 ..	
994 9221 001	. R-SB KIT HT 500FM	..... 0 ..	

BASIC HT 500FM SS FM XMTR - 994 9195 002

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
943 5135 023	. CABLE PKG, HT 250/500 FM	.... 1 ..	
992 8116 001	. LOW PWR FM, 500W PA	..... 1 ..	UNIT 3
992 8123 001	. AC DISTRIBUTION ASSY	..... 1 ..	UNIT 6
992 8142 001	. CABINET RAK 80B LPFM	..... 1 ..	UNIT 8
992 8239 001	. MISC. PARTS HT500FM	..... 1 ..	
992 8240 001	. CONTROLLER, LOW PWR FM	... 1 ..	UNIT 1

LOW PWR FM, 500W PA - 992 8116 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0086 000	. CORD, W/PLUG ASSY	..... 1 ..	#B001
250 0474 000	. CORD W/PLUG ASSY	..... 1 ..	#FL001
357 0089 000	. GUIDE, MODULE	..... 2 ..	
358 0002 000	. BRACKET RESISTOR MTG	..... 4 ..	#R001 #R002
358 1971 000	. BUSHING SR7W-2	..... 1 ..	#FL001
358 2996 000	. END PLATE, 262 TERM BD	..... 1 ..	#TB001
358 3121 000	. STUD, BRS 10-32 X 1	..... 3 ..	#C004 #C005 #E001
380 0716 000	. TRANSISTOR 2N5684	..... 4 ..	Q001 Q002 Q003 Q004

384 0761 000	. BRIDGE RECT 100A	1	CR001
410 0391 000	. INSULATOR TRANSISTOR T03	4	#Q001 #Q002 #Q003 #Q004
430 0205 000	. FAN 230VAC 260CFM	1	B001
442 0108 000	. SW, THERMOSTAT OPEN 85 DEG C	1	S001
476 0415 000	. CH, 0.4MH 30A	1	L001
484 0370 000	. FILTER AC LINE 120/250VAC	1	FL001
526 0376 000	. CAP 10UF 660V	2	C001 C002
526 0377 000	. CAP 42000UF 60V -10/+75%	2	C004 C005
530 0090 000	. BRACKET, CAP. 2.5" ID	2	#C004 #C005
540 0623 000	. RES 3.3K OHM 2W 5%	1	R003
542 0169 000	. RES 25.0 OHM 25W	1	R002
542 0208 000	. RES 100.0 OHM 50W	1	R001
606 0806 000	. CB 15A 2P 250VAC 50/60HZ	1	CB001
614 0788 000	. TERM BD, 2C MODULAR 262	2	#TB001
614 0789 000	. TERM BD, 4C MODULAR 262	2	#TB001
620 0122 000	. ADPTR ANGLE N UG27CU	1	A1J2
740 1110 000	. AMP MODULE 700W,86-108MHZ	1	
817 2130 007	. FILTER	1	
817 2130 008	. CHASSIS LATCH	1	
22 0975 024	. TERMINAL COVER PLT	1	
839 7909 017	. PA PWR SUPPLY HS	1	
843 5135 031	. PA TOP	1	
922 0446 060	. SOCKET, TRANSISTOR	4	#Q001 #Q002 #Q003 #Q004
922 0975 004	. CAP BRKT	1	
939 7909 013	. FILTER HOLDER	1	
939 7909 014	. MODULE BRKT	1	
939 7909 015	. MODULE BRKT	1	
939 7909 042	. PA FRONT PANEL	1	
943 5135 003	. FAN MTG PANEL	1	
943 5135 004	. PA REAR PANEL	1	
943 5135 005	. MOUNTING FRAME	1	
943 5135 019	. CABLE PKG, 500W/250W	1	
943 5135 033	. PA CHASSIS	1	
992 8119 001	. REGULATOR & DISPLAY BD	1	A002

MISC. PARTS HT500FM - 992 8239 001

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
250 0473 000	. CORD, W/PLUG ASSY	1	#UNIT 7
484 0385 000	. FILTER, LOWPASS, 1200W FM	1	FL002
620 0122 000	. ADPTR ANGLE N UG27CU	1	#FL2
620 2548 000	. RECP, FEMALE N PANEL	1	#DC1
620 2564 000	. DIR. COUPLER, DUAL SOCKET	1	DC001
620 2574 000	. ELEMENT 500W	1	#DC1
620 2576 000	. ELEMENT 50W	1	#DC1
620 2581 000	. CONNECTOR, TYPE N MALE,	1	#DC1
817 2130 007	. FILTER	1	#UNIT 3
831 5483 003	. PANEL, BLANK 1-3/4 IN.	1	
831 5483 027	. PANEL, BLANK 7 IN.	5	
606 0806 000	. CB 15A 2P 250VAC 50/60HZ	1	#PACB1
740 1110 000	. AMP MODULE 700W, 86-108MHZ	1	#PA

XMTR, HT-250FM RACKED - 994 9233 001

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
472 1675 000	. XFMR, PWR, 60HZ, FERRO	0	T1 (1 REQ'D)
472 1676 000	. XFMR, PWR, 50HZ FERRO	0	T1 (1 REQ'D)
740 1109 000	. MODULE, 300W SS AMPLIFIER	0	5A1

888-2312-002

WARNING: Disconnect primary power prior to servicing.

989 0085 001	. PKG CK LIST LPFM RACKED	.... 0 ..	
990 1096 001	. R-SC KIT HT 250FM	..... 0 ..	
992 8240 001	. CONTROLLER, LOW PWR FM	... 0 ..	UNIT 1
994 9124 001	. FM EXCITER, THE-1	..... 1 ..	UNIT 7
994 9218 001	. R-SP KIT HT 250FM	..... 0 ..	
994 9219 001	. R-SB KIT HT 250FM	..... 0 ..	
994 9233 002	. BASIC HT-250FM SS FM XMTR	... 1 ..	

XMTR, HT250FM LESS RACK - 994 9233 003

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0473 000	. CORD, W/PLUG ASSY	..... 1 ..	#UNIT 7
424 0100 000	. BUMPER .8125 SQ	..... 4 ..	
472 1675 000	. XFMR, PWR, 60HZ, FERRO	..... 0 ..	T1 (REQ'D)
472 1676 000	. XFMR, PWR, 50HZ FERRO	..... 0 ..	T1 (1REQ'D)
484 0385 000	. FILTER, LOWPASS, 1200W FM	... 1 ..	FL002
620 0122 000	. ADPTR ANGLE N UG27CU	..... 1 ..	#FL2
620 2548 000	. RECP, FEMALE N PANEL	..... 1 ..	#DC1
620 2564 000	. DIR. COUPLER, DUAL SOCKET	.. 1 ..	DC001
620 2575 000	. ELEMENT 250W	..... 1 ..	#DC1
620 2577 000	. ELEMENT 25W	..... 1 ..	#DC1
620 2581 000	. CONNECTOR, TYPE N MALE,	... 1 ..	#DC1
740 1109 000	. MODULE, 300W SS AMPLIFIER	... 0 ..	5A1
817 2130 007	. FILTER	..... 1 ..	#UNIT 5
839 7909 035	. CABINET OUTLINE, HT 250FM	... 0 ..	
843 5135 026	. SCHEM, OVERALL, HT250FM	.... 0 ..	
943 5135 023	. CABLE PKG, HT 250/500 FM	..... 1 ..	
989 0084 001	. PKG CK LIST LPFM LESS RACK	.. 0 ..	
990 1096 001	. R-SC KIT HT 250FM	..... 0 ..	
992 8123 001	. AC DISTRIBUTION ASSY	..... 1 ..	UNIT 6
992 8240 001	. CONTROLLER, LOW PWR FM	... 1 ..	UNIT 1
994 9124 001	. FM EXCITER, THE-1	..... 1 ..	UNIT 7
994 9218 001	. R-SP KIT HT 250FM	..... 0 ..	
994 9219 001	. R-SB KIT HT 250FM	..... 0 ..	

BASIC HT-250FM SS FM XMTR - 994 9233 002

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
943 5135 023	. CABLE PKG, HT 250/500 FM	..... 1 ..	
992 8115 001	. LOW PWR FM, 250W PA	..... 1 ..	UNIT 5
992 8123 001	. AC DISTRIBUTION ASSY	..... 1 ..	UNIT 6
992 8142 001	. CABINET RAK 80B LPFM	..... 1 ..	UNIT 8
992 8238 001	. MISC. PARTS, HT250FM	..... 1 ..	
992 8240 001	. CONTROLLER, LOW PWR FM	... 1 ..	UNIT 1

CABLE PKG, HT 250/500 FM - 943 5135 023

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
253 0074 000	. CABLE, 4C 22AWG SHLD	..... 2.5 .FT	
354 0729 000	. CONTACT, SOCKET 30-26 AWG	.. 4 ..	
354 0730 000	. CONTACT, PIN 24-20 AWG	..... 4 ..	
610 0912 000	. HOUSING, PLUG 6 CKT	..... 1 ..	
612 1143 000	. HOUSING, RECEPT 6 CKT	..... 1 ..	
618 0051 000	. COAX CABLE RG58C U	..... 5.8 .FT	
618 0188 000	. COAX CABLE RG213/U	..... 1 ..FT	
620 1948 000	. PLUG, STRAIGHT TYPE N	..... 2 ..	
620 1951 000	. STRAIGHT PLUG BNC CRIMP	... 4 ..	
252 0008 000	. WIRE, STRD 10AWG GRY	..... 8.8 .FT	
354 0324 000	. LUG #10 RING YEL 12-10AWG	... 6 ..	

LOW PWR FM, 250W PA - 992 8115 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0086 000	. CORD, W/PLUG ASSY	1	#B001
250 0474 000	. CORD W/PLUG ASSY	1	#FL001
357 0089 000	. GUIDE, MODULE	2	
358 0002 000	. BRACKET RESISTOR MTG	4	#R001 #R002
358 1971 000	. BUSHING SR7W-2	1	#FL001
358 2996 000	. END PLATE, 262 TERM BD	1	#TB001
358 3121 000	. STUD, BRS 10-32 X 1	3	#C004 #C005 #E001
380 0716 000	. TRANSISTOR 2N5684	2	Q001 Q002
384 0761 000	. BRIDGE RECT 100A	1	CR001
410 0378 000	. INSULATOR T03	2	#Q001 #Q002
430 0205 000	. FAN 230VAC 260CFM	1	B001
442 0108 000	. SW, THMOSTAT OPEN 85 DEG C	1	S001
476 0415 000	. CH, 0.4MH 30A	1	L001
484 0370 000	. FILTER AC LINE 120/250VAC	1	FL001
526 0376 000	. CAP 10UF 660V	2	C001 C002
526 0377 000	. CAP 42000UF 60V -10/+75%	2	C004 C005
530 0090 000	. BRACKET, CAP. 2.5" ID	2	#C004 #C005
540 0623 000	. RES 3.3K OHM 2W 5%	1	R003
542 0169 000	. RES 25.0 OHM 25W	1	R002
542 0208 000	. RES 100.0 OHM 50W	1	R001
606 0786 000	. CB 10A 2P 250VAC 50/60HZ	1	CB001
614 0788 000	. TERM BD, 2C MODULAR 262	2	#TB001
614 0789 000	. TERM BD, 4C MODULAR 262	2	#TB001
620 0122 000	. ADPTR ANGLE N UG27CU	1	#A1J2
646 0665 000	. INSPECTION LABEL	1	
646 1078 001	. PLT, LOGO 2.0LG PLSTC	1	
740 1109 000	. MODULE, 300W SS AMPLIFIER	1	
817 2130 007	. FILTER	1	
817 2130 008	. CHASSIS LATCH	1	
822 0975 024	. TERMINAL COVER PLT	1	
839 7909 017	. PA PWR SUPPLY HS	1	
843 5135 006	. PA TOP	1	
922 0446 060	. SOCKET, TRANSISTOR	2	#Q001 #Q002
922 0975 004	. CAP BRKT	1	
939 7909 013	. FILTER HOLDER	1	
939 7909 014	. MODULE BRKT	1	
939 7909 015	. MODULE BRKT	1	
939 7909 042	. PA FRONT PANEL	1	
943 5135 003	. FAN MTG PANEL	1	
943 5135 004	. PA REAR PANEL	1	
943 5135 019	. CABLE PKG, 500W/250W	1	
943 5135 033	. PA CHASSIS	1	
992 8119 001	. REGULATOR & DISPLAY BD	1	A002

MISC. PARTS, HT250FM - 992 8238 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0473 000	. CORD, W/PLUG ASSY	1	#UNIT 7
484 0385 000	. FILTER, LOWPASS, 1200W FM	1	FL002
620 0122 000	. ADPTR ANGLE N UG27CU	1	#FL2
620 2548 000	. RECP, FEMALE N PANEL	1	#DC1
620 2564 000	. DIR. COUPLER, DUAL SOCKET	1	DC001
620 2575 000	. ELEMENT 250W	1	#DC1
620 2577 000	. ELEMENT 25W	1	#DC1
620 2581 000	. CONNECTOR, TYPE N MALE,	1	#DC1

817 2130 007	. FILTER	.....	1	..	#UNIT 5
831 5483 003	. PANEL, BLANK 1-3/4 IN.	.....	1	..	
831 5483 027	. PANEL, BLANK 7 IN.	.....	5	..	
606 0786 000	.. CB 10A 2P 250VAC 50/60HZ	.....	1		#PACB1
740 1109 000	.. MODULE, 300W SS AMPLIFIER	...	1		#PA

MISC. PARTS HT500FM - 992 8239 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0473 000	. CORD, W/PLUG ASSY	1	#UNIT 7
484 0385 000	. FILTER, LOWPASS, 1200W FM	1	FL002
620 0122 000	. ADPTR ANGLE N UG27CU	1	#FL2
620 2548 000	. RECP, FEMALE N PANEL	1	#DC1
620 2564 000	. DIR. COUPLER, DUAL SOCKET	1	DC001
620 2574 000	. ELEMENT 500W	1	#DC1
620 2576 000	. ELEMENT 50W	1	#DC1
620 2581 000	. CONNECTOR, TYPE N MALE,	1	#DC1
817 2130 007	. FILTER	1	#UNIT 3
831 5483 003	. PANEL, BLANK 1-3/4 IN.	1	
831 5483 027	. PANEL, BLANK 7 IN.	5	

R-SC KIT HT 500FM - 990 1097 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
380 0116 000	. XSTR, 2N3866	1	
380 0126 000	. XSTR, 2N4403	2	
380 0189 000	. XSTR, 2N3904	5	
380 0190 000	. XSTR, 2N3906	3	
380 0191 000	. XSTR, MJE371	1	
380 0192 000	. XSTR, MJE521	1	
380 0195 000	. XSTR, 2N4239	2	
380 0319 000	. XSTR, MPS-A14	1	
380 0421 000	. XSTR, 2N4258	2	
380 0536 000	. XSTR, 2N5179	1	
380 0614 000	. XSTR, MJ11028	2	
380 0622 000	. XSTR, U310 ESD	1	
380 0678 000	. XSTR, ARRAY QUAD 2222	2	
380 0716 000	. TRANSISTOR 2N5684	2	
382 0130 000	. IC, MCT2/IL74	2	
382 0148 000	. IC, SN74123N	2	
382 0359 000	. IC, 7815	3	
382 0360 000	. IC, 7915	3	
382 0379 000	. IC, 723	3	
382 0406 000	. IC, MC7812CT	1	
382 0415 000	. IC, 324 ESD	2	
382 0419 000	. IC, 74C14 ESD	1	
382 0428 000	. IC, LM358	5	
382 0452 000	. IC, LM311/CA311	1	
382 0465 000	. IC, 74C74 ESD	1	
382 0472 000	. IC, LM318	3	
382 0475 000	. IC, 317	2	
382 0498 000	. IC, 74C20 ESD	1	
382 0523 000	. IC, MC14066BCPDS ESD	2	
382 0527 000	. IC, 340K-5/7805K +5V REG	1	
382 0541 000	. IC, MC10178L	2	
382 0552 000	. IC, TL074CN3	2	
382 0561 000	. IC, 74LS74	2	
382 0593 000	. IC, TL072ACP	1	
382 0608 000	. IC, TL072CP3	1	
382 0623 000	. IC, 74LS161AN	2	
382 0646 000	. IC, 0808 ESD	1	
382 0657 000	. IC, 74LS20N TTL GATE	2	
382 0719 000	. IC LM324AN	1	
382 0732 000	. IC, 74LS90	2	

382 0733 000 . IC, 74LS93 2 ..
 382 0734 000 . IC, CA2830 1 ..
 382 0735 000 . IC MM74C932N ESD 2 ..
 382 0771 000 . IC 74HC08 2 ..
 382 0874 000 . IC, LM337K 1 ..
 382 1014 000 . IC, 74C193/40193 ESD 2 ..
 382 1015 000 . IC, CD4048B ESD 2 ..
 382 1016 000 . IC, MM74C240N ESD 1 ..
 382 1017 000 . IC, MM74C244N ESD 1 ..
 382 1070 000 . IC, ILQ-1 OPTO-ISOLATOR 2 ..
 384 0020 000 . RECTIFIER IN4005 2 ..
 384 0205 000 . DIODE SILICON 1N914/4148 6 ..
 384 0321 000 . DIODE 5082-2800/1N5711 3 ..
 384 0341 000 . RECTIFIER 1N5404 1 ..
 384 0355 000 . DIODE HP5082-3081/A5S139 1 ..
 384 0431 000 . RECT. 1N4001 6 ..
 384 0610 000 . LED, GREEN 5 ..
 384 0611 000 . LED, RED 5 ..
 384 0665 000 . RECT, BRIDGE MDA-201 2 ..
 384 0720 000 . DIODE, 15V ICTE-15 6 ..
 384 0736 000 . RECT,HIGH CURRENT MR751 ... 1 ..
 384 0761 000 . BRIDGE RECT 100A 1 ..
 384 0762 000 . TRIAC 2N6343A 1 ..
 384 0782 000 . RECT, MR754 400V 6A 2 ..
 384 0799 000 . DIODE, BIPOLAR SA12C 2 ..
 384 0805 000 . RECT, 1N5391 50V 1 ..
 384 0820 000 . DIODE 10V LCE10A 2 ..
 384 0838 000 . DIODE, 36V ICTE-36 2 ..
 386 0062 000 . ZENER, 1N4753 36V 2 ..
 386 0085 000 . ZENER, 1N4740A 10V 1 ..
 386 0092 000 . ZENER, 1N4744 15V 3 ..
 386 0135 000 . ZENER, 1N4733A 5.1V 3 ..
 386 0138 000 . ZENER, 1N4750A 27V 2 ..
 386 0186 000 . ZENER, 1N4737A 7.5V 1 ..
 386 0300 000 . ZENER, 1N4730A 3.9V 1 ..
 386 0432 000 . DIODE ZENER 1.8V 1 ..
 398 0045 000 . FUSE,SLOW CART .250A 250V ... 2 ..
 398 0054 000 . FUSE, SLOW CART 1A 250V 5 ..
 398 0081 000 . FUSE,SLO CART 2A 125/250V 5 ..
 398 0086 000 . FUSE, SLOW CART 4A 5 ..
 398 0453 000 . FUSE, FAST CART 7A 250V 5 ..
 528 0036 000 . DIODE VARACTOR KV3901 2 ..
 559 0043 000 . THERMISTOR 2K OHM 1 ..
 560 0035 000 . MOV 4500A 35J 130 VAC 4 ..
 560 0060 000 . MOV 250A 2.5J - 40 VAC 3 ..

R-SP KIT HT 500FM - 994 9220 001

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
404 0673 000	. SOCKET 8 PIN DIP (DL)	2 ..	
404 0674 000	. SOCKET 14 PIN DIP (D-L)	2 ..	
404 0675 000	. SOCKET IC 16 CONT	2 ..	
404 0704 000	. SOCKET IC 20 PIN	1 ..	
404 0776 000	. SOCKET TRANSISTOR TO-3	2 ..	
410 0378 000	. INSULATOR T03	4 ..	
410 0384 000	. INSULATOR #4 SCREW	4 ..	
410 0391 000	. INSULATOR TRANSISTOR T03 ..	4 ..	

430 0030 000 . FAN 115VAC 115CFM 50/60HZ ... 1 .
 430 0205 000 . FAN 230VAC 260CFM 1 .
 442 0108 000 . SW,THMOSTAT OPEN 85 DEG C . 1 .
 484 0296 000 . FILTER RFI POWER LINE 1 .
 484 0370 000 . FILTER AC LINE 120/250VAC 1 .
 506 0232 000 . CAP .01UF 100V 5% 3 .
 506 0243 000 . CAP .15UF 63V 5% 2 .
 516 0453 000 . CAP .1UF 100V 20% 3 .
 516 0530 000 . CAP 0.01UF 100V 20% 2 .
 516 0777 000 . CAP 100PF 50V 10% COG 2 .
 516 0778 000 . CAP 120PF 50V 10% 2 .
 516 0859 000 . CAP 470PF 50V 10% 2 .
 522 0384 000 . CAP 2000UF 25V 2 .
 522 0391 000 . CAP 1000UF 16V 2 .
 522 0422 000 . CAP 1000 UF 10V 2 .
 522 0523 000 . CAP 470UF 16V 1 .
 522 0524 000 . CAP 10 UF 25V 30% 2 .
 522 0547 000 . CAP 3300UF 40V-10%, +50% 2 .
 522 0548 000 . CAP 10UF 50V ELECTROLYTIC ... 2 .
 522 0566 000 . CAP 100UF 63V 20% 2 .
 522 0570 000 . CAP 2.2UF 50V 1 .
 524 0340 000 . CAP 15,000UF 50V 1 .
 526 0049 000 . CAP 6.8UF 35V 20% 2 .
 526 0050 000 . CAP 1UF 35V 20% 2 .
 526 0096 000 . CAP 100UF 10V 20% 2 .
 526 0097 000 . CAP 47 UF 35V 20% 2 .
 526 0238 000 . CAP 33UF 35V 20% 1 .
 526 0311 000 . CAP 2.2UF 35V 10% 2 .
 526 0351 000 . CAP 6.8UF 50V 20% 2 .
 526 0362 000 . CAP 10UF 50V 20% 2 .
 526 0374 000 . CAP 1.0F 5V 1 .
 526 0376 000 . CAP 10UF 660V 1 .
 526 0377 000 . CAP 42000UF 60V -10/+75% 1 .
 540 0018 000 . RES 51.0 OHM 1/2W 5% 1 .
 540 0025 000 . RES 100 OHM 1/2W 5% 1 .
 550 0398 000 . POT 1K OHM 1/2W 10% 1 .
 550 0913 000 . POT, 5K OHM 1 .
 550 0914 000 . POT, 10K OHM 2 .
 550 0921 000 . POT 100K OHM 1/2W 1 .
 550 0922 000 . POT 10K OHM 1/2W 1 .
 550 0923 000 . POT 1K OHM 1/2W 2 .
 550 0927 000 . POT 2K OHM 1/2W 2 .
 550 0939 000 . POT 100K OHM 1/2W 1 .
 550 1028 000 . POT 20 OHM 1/2W 10% 1 .
 550 1069 000 . POT 5K OHM 1/2W 1 .
 574 0464 000 . RELAY 24V,6A, SPDT,PC MTG ... 1 .
 574 0472 000 . RELAY, 12VDC 8A PC MT 1 .
 604 0851 000 . SW, RKR 8PST DIP 1 .
 604 0852 000 . SW, RKR DIP 4-SPST 1 .
 604 0903 000 . SWITCH, TGL SPDT MOM OFF ... 1 .
 604 1091 000 . SWITCH, PB-10 POSITION 1 .
 604 1110 000 . SWITCH, PB-6 POSITION 1 .
 606 0806 000 . CB 15A 2P 250VAC 50/60HZ 1 .
 610 0679 000 . PLUG, SHORTING 1 .
 612 0693 000 . TEST JACK 3 .
 612 1184 000 . JUMPER .1" CENTERS 1 .

612 1280 000 . CONN 36 DUAL POS ZIF 1 ..
 700 0423 000 . OSC XTAL 10MHZ 1 ..
 817 2130 007 . FILTER 6 ..

R-SB KIT HT 500FM - 994 9221 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
992 8119 001	. REGULATOR & DISPLAY BD	1 ..	3A2
992 8124 001	. INTERFACE BD	1 ..	1A2
992 8125 001	. CONTROLLER BD	1 ..	1A1

XMTR, HT-250FM RACKED - 994 9233 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
472 1675 000	. XFMR, PWR, 60HZ, FERRO	0 ..	T1 (1 REQ'D)
472 1676 000	. XFMR, PWR, 50HZ FERRO	0 ..	T1 (1REQ'D)
740 1109 000	. MODULE, 300W SS AMPLIFIER ...	0 ..	5A1
989 0085 001	. PKG CK LIST LPFM RACKED	0 ..	
990 1096 001	. R-SC KIT HT 250FM	0 ..	
992 8115 001	. LOW PWR FM, 250W PA	0 ..	UNIT 5
992 8240 001	. CONTROLLER, LOW PWR FM ...	0 ..	UNIT 1
994 9124 001	. FM EXCITER, THE-1	1 ..	UNIT 7
994 9218 001	. R-SP KIT HT 250FM	0 ..	
994 9219 001	. R-SB KIT HT 250FM	0 ..	
994 9233 002	. BASIC HT-250FM SS FM XMTR ...	1 ..	

XMTR, HT250FM LESS RACK - 994 9233 003

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0473 000	. CORD, W/PLUG ASSY	1 ..	#UNIT 7
424 0100 000	. BUMPER .8125 SQ	4 ..	
472 1675 000	. XFMR, PWR, 60HZ, FERRO	0 ..	T1 (REQ'D)
472 1676 000	. XFMR, PWR, 50HZ FERRO	0 ..	T1 (1REQ'D)
484 0385 000	. FILTER, LOWPASS, 1200W FM ...	1 ..	FL002
620 0122 000	. ADPTR ANGLE N UG27CU	1 ..	#FL2
620 2548 000	. RECP, FEMALE N PANEL	1 ..	#DC1
620 2564 000	. DIR. COUPLER, DUAL SOCKET ..	1 ..	DC001
620 2575 000	. ELEMENT 250W	1 ..	#DC1
620 2577 000	. ELEMENT 25W	1 ..	#DC1
620 2581 000	. CONNECTOR, TYPE N MALE, ...	1 ..	#DC1
740 1109 000	. MODULE, 300W SS AMPLIFIER ...	0 ..	5A1
817 2130 007	. FILTER	1 ..	#UNIT 5
817 2130 024	. RUNNING LIST, 250/500FM	0 ..	
839 7909 035	. CABINET OUTLINE, HT 250FM ...	0 ..	
839 7909 043	. FAMILY TREE, HT250	0 ..	
843 5135 026	. SCHEM, OVERALL, HT250FM	0 ..	
939 7909 028	. CORNER POST	4 ..	
943 5135 023	. CABLE PKG, HT 250/500 FM	1 ..	
988 2312 001	. DP HT-250/500/1FM	1 ..	
989 0084 001	. PKG CK LIST LPFM LESSRACK ..	0 ..	
990 1096 001	. R-SC KIT HT 250FM	0 ..	
992 8115 001	. LOW PWR FM, 250W PA	1 ..	UNIT 5
992 8115 001	. LOW PWR FM, 250W PA	0 ..	UNIT 5
992 8123 001	. AC DISTRIBUTION ASSY	1 ..	UNIT 6
992 8240 001	. CONTROLLER, LOW PWR FM ...	1 ..	UNIT 1
994 9124 001	. FM EXCITER, THE-1	1 ..	UNIT 7
994 9218 001	. R-SP KIT HT 250FM	0 ..	
994 9219 001	. R-SB KIT HT 250FM	0 ..	

BASIC HT-250FM SS FM XMTR - 994 9233 002

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
943 5135 023	. CABLE PKG, HT 250/500 FM	1 .	
992 8115 001	. LOW PWR FM, 250W PA	1 .	UNIT 5
992 8123 001	. AC DISTRIBUTION ASSY	1 .	UNIT 6
992 8142 001	. CABINET RAK 80B LPFM	1 .	UNIT 8
992 8238 001	. MISC. PARTS, HT250FM	1 .	
992 8240 001	. CONTROLLER, LOW PWR FM	1 .	UNIT 1

CABLE PKG, HT 250/500 FM - 943 5135 023

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
253 0074 000	. CABLE, 4C 22AWG SHLD	2.5 FT	
354 0729 000	. CONTACT, SOCKET 30-26 AWG	4 .	
354 0730 000	. CONTACT, PIN 24-20 AWG	4 .	
610 0912 000	. HOUSING, PLUG 6 CKT	1 .	
612 1143 000	. HOUSING, RECEPT 6 CKT	1 .	
618 0051 000	. COAX CABLE RG58C U	5.8 FT	
618 0188 000	. COAX CABLE RG213/U	1 . FT	
620 1948 000	. PLUG, STRAIGHT TYPE N	2 .	
620 1951 000	. STRAIGHT PLUG BNC CRIMP	4 .	
296 0262 000	. TUBING, SHRINKABLE .25 . . . . .	.5 . FT	
296 0264 000	. TUBING, SHRINKABLE .5 . . . . .	.5 . FT	
252 0008 000	. WIRE, STRD 10AWG GRY	8.8 FT	
354 0324 000	. LUG #10 RING YEL 12-10AWG	6 .	

LOW PWR FM, 250W PA - 992 8115 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0086 000	. CORD, W/PLUG ASSY	1 .	#B001
250 0474 000	. CORD W/PLUG ASSY	1 .	#FL001
357 0089 000	. GUIDE, MODULE	2 .	
358 0002 000	. BRACKET RESISTOR MTG	4 .	#R001 #R002
358 1971 000	. BUSHING SR7W-2	1 .	#FL001
358 2996 000	. END PLATE, 262 TERM BD	1 .	#TB001
358 3121 000	. STUD, BRS 10-32 X 1	3 .	#C004 #C005 #E001
380 0716 000	. TRANSISTOR 2N5684	2 .	Q001 Q002
384 0761 000	. BRIDGE RECT 100A	1 .	CR001
410 0378 000	. INSULATOR T03	2 .	#Q001 #Q002
430 0205 000	. FAN 230VAC 260CFM	1 .	B001
442 0108 000	. SW, THMOSTAT OPEN 85 DEG C	1 .	S001
476 0415 000	. CH, 0.4MH 30A	1 .	L001
484 0370 000	. FILTER AC LINE 120/250VAC	1 .	FL001
526 0376 000	. CAP 10UF 660V	2 .	C001 C002
526 0377 000	. CAP 42000UF 60V -10/+75%	2 .	C004 C005
530 0090 000	. BRACKET, CAP. 2.5" ID	2 .	#C004 #C005
540 0623 000	. RES 3.3K OHM 2W 5%	1 .	R003
542 0169 000	. RES 25.0 OHM 25W	1 .	R002
542 0208 000	. RES 100.0 OHM 50W	1 .	R001
606 0786 000	. CB 10A 2P 250VAC 50/60HZ	1 .	CB001
614 0788 000	. TERM BD, 2C MODULAR 262	2 .	#TB001
614 0789 000	. TERM BD, 4C MODULAR 262	2 .	#TB001
620 0122 000	. ADPTR ANGLE N UG27CU	1 .	#A1J2
646 0665 000	. INSPECTION LABEL	1 .	
646 1078 001	. PLT, LOGO 2.0LG PLSTC	1 .	
740 1109 000	. MODULE, 300W SS AMPLIFIER	1 .	
817 2130 007	. FILTER	1 .	
817 2130 008	. CHASSIS LATCH	1 .	

817 2130 010	. RUNNING LIST 500/250W PA	.... 0 ..	
822 0622 001	. STRAP	..... 1 ..	
822 0849 008	. HANDLE	..... 2 ..	
822 0975 020	. STRAP	..... 1 ..	
822 0975 024	. TERMINAL COVER PLT	..... 1 ..	
839 7909 017	. PA PWR SUPPLY HS	..... 1 ..	
843 5135 006	. PA TOP	..... 1 ..	
922 0446 060	. SOCKET, TRANSISTOR	..... 2 ..	#Q001 #Q002
922 0975 004	. CAP BRKT	..... 1 ..	
939 7909 013	. FILTER HOLDER	..... 1 ..	
939 7909 014	. MODULE BRKT	..... 1 ..	
939 7909 015	. MODULE BRKT	..... 1 ..	
939 7909 042	. PA FRONT PANEL	..... 1 ..	
943 5135 003	. FAN MTG PANEL	..... 1 ..	
943 5135 004	. PA REAR PANEL	..... 1 ..	
943 5135 005	. MOUNTING FRAME	..... 1 ..	
943 5135 019	. CABLE PKG, 500W/250W	..... 1 ..	
943 5135 033	. PA CHASSIS	..... 1 ..	
992 8119 001	. REGULATOR & DISPLAY BD	.... 1 ..	A002

MISC. PARTS, HT250FM - 992 8238 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
250 0473 000	. CORD, W/PLUG ASSY	..... 1 ..	#UNIT 7
484 0385 000	. FILTER, LOWPASS, 1200W FM	... 1 ..	FL002
620 0122 000	. ADPTR ANGLE N UG27CU	..... 1 ..	#FL2
620 2548 000	. RECP, FEMALE N PANEL	..... 1 ..	#DC1
620 2564 000	. DIR. COUPLER, DUAL SOCKET	.. 1 ..	DC001
620 2575 000	. ELEMENT 250W	..... 1 ..	#DC1
620 2577 000	. ELEMENT 25W	..... 1 ..	#DC1
620 2581 000	. CONNECTOR, TYPE N MALE,	... 1 ..	#DC1
817 2130 007	. FILTER	..... 1 ..	#UNIT 5
831 5483 003	. PANEL, BLANK 1-3/4 IN.	..... 1 ..	
831 5483 027	. PANEL, BLANK 7 IN.	..... 5 ..	
939 7909 028	. CORNER POST	..... 2 ..	

R-SC KIT HT 250FM - 990 1096 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
380 0116 000	. XSTR, 2N3866	..... 1 ..	
380 0126 000	. XSTR, 2N4403	..... 2 ..	
380 0189 000	. XSTR, 2N3904	..... 6 ..	
380 0190 000	. XSTR, 2N3906	..... 3 ..	
380 0191 000	. XSTR, MJE371	..... 1 ..	
380 0192 000	. XSTR, MJE521	..... 1 ..	
380 0195 000	. XSTR, 2N4239	..... 2 ..	
380 0319 000	. XSTR, MPS-A14	..... 1 ..	
380 0421 000	. XSTR, 2N4258	..... 2 ..	
380 0536 000	. XSTR, 2N5179	..... 1 ..	
380 0614 000	. XSTR, MJ11028	..... 2 ..	
380 0622 000	. XSTR, U310 ESD	..... 1 ..	
380 0678 000	. XSTR, ARRAY QUAD 2222	..... 2 ..	
380 0716 000	. TRANSISTOR 2N5684	..... 2 ..	
382 0130 000	. IC, MCT2/IL74	..... 2 ..	
382 0148 000	. IC, SN74123N	..... 2 ..	
382 0359 000	. IC, 7815	..... 3 ..	
382 0360 000	. IC, 7915	..... 3 ..	
382 0379 000	. IC, 723	..... 3 ..	

382 0406 000 . IC, MC7812CT 1 .
 382 0415 000 . IC, 324 ESD 2 .
 382 0419 000 . IC, 74C14 ESD 1 .
 382 0428 000 . IC, LM358 5 .
 382 0452 000 . IC, LM311/CA311 1 .
 382 0465 000 . IC, 74C74 ESD 1 .
 382 0472 000 . IC, LM318 3 .
 382 0475 000 . IC, 317 2 .
 382 0498 000 . IC, 74C20 ESD 1 .
 382 0523 000 . IC, MC14066BCPDS ESD 2 .
 382 0527 000 . IC, 340K-5/7805K +5V REG 1 .
 382 0541 000 . IC, MC10178L 2 .
 382 0552 000 . IC, TL074CN3 2 .
 382 0561 000 . IC, 74LS74 2 .
 382 0593 000 . IC, TL072ACP 1 .
 382 0608 000 . IC, TL072CP3 1 .
 382 0623 000 . IC, 74LS161AN 2 .
 382 0646 000 . IC, 0808 ESD 1 .
 382 0657 000 . IC, 74LS20N TTL GATE 2 .
 382 0719 000 . IC LM324AN 1 .
 382 0732 000 . IC, 74LS90 2 .
 382 0733 000 . IC, 74LS93 2 .
 382 0734 000 . IC, CA2830 1 .
 382 0735 000 . IC MM74C932N ESD 2 .
 382 0771 000 . IC 74HC08 2 .
 382 0874 000 . IC, LM337K 1 .
 382 1014 000 . IC, 74C193/40193 ESD 2 .
 382 1015 000 . IC, CD4048B ESD 2 .
 382 1016 000 . IC, MM74C240N ESD 1 .
 382 1017 000 . IC, MM74C244N ESD 1 .
 382 1070 000 . IC, ILQ-1 OPTO-ISOLATOR 2 .
 384 0020 000 . RECTIFIER IN4005 2 .
 384 0205 000 . DIODE SILICON 1N914/4148 10 .
 384 0321 000 . DIODE 5082-2800/1N5711 3 .
 384 0341 000 . RECTIFIER 1N5404 1 .
 384 0355 000 . DIODE HP5082-3081/A5S139 1 .
 384 0431 000 . RECT. 1N4001 6 .
 384 0610 000 . LED, GREEN 5 .
 384 0611 000 . LED, RED 5 .
 384 0665 000 . RECT, BRIDGE MDA-201 2 .
 384 0720 000 . DIODE, 15V ICTE-15 6 .
 384 0736 000 . RECT,HIGH CURRENT MR751 ... 1 .
 384 0761 000 . BRIDGE RECT 100A 1 .
 384 0762 000 . TRIAC 2N6343A 1 .
 384 0782 000 . RECT, MR754 400V 6A 2 .
 384 0799 000 . DIODE, BIPOLAR SA12C 2 .
 384 0805 000 . RECT, 1N5391 50V 1 .
 384 0820 000 . DIODE 10V LCE10A 2 .
 384 0838 000 . DIODE, 36V ICTE-36 2 .
 386 0062 000 . ZENER, 1N4753 36V 2 .
 386 0085 000 . ZENER, 1N4740A 10V 1 .
 386 0092 000 . ZENER, 1N4744 15V 3 .
 386 0135 000 . ZENER, 1N4733A 5.1V 3 .
 386 0138 000 . ZENER, 1N4750A 27V 2 .
 386 0186 000 . ZENER, 1N4737A 7.5V 1 .
 386 0300 000 . ZENER, 1N4730A 3.9V 1 .

386 0432 000 . DIODE ZENER 1.8V 1 ..
 398 0045 000 . FUSE,SLOW CART .250A 250V ... 5 ..
 398 0054 000 . FUSE, SLOW CART 1A 250V 5 ..
 398 0081 000 . FUSE,SLO CART 2A 125/250V 5 ..
 398 0086 000 . FUSE, SLOW CART 4A 5 ..
 398 0453 000 . FUSE, FAST CART 7A 250V 5 ..
 528 0036 000 . DIODE VARACTOR KV3901 2 ..
 559 0043 000 . THERMISTOR 2K OHM 1 ..
 560 0035 000 . MOV 4500A 35J 130 VAC 4 ..
 560 0060 000 . MOV 250A 2.5J - 40 VAC 3 ..

R-SP KIT HT 250FM - 994 9218 001

HARRIS P/N	DESCRIPTION	QTY/UM	REF. SYMBOLS/EXPLANATIONS
404 0673 000	. SOCKET 8 PIN DIP (DL)	2 ..	
404 0674 000	. SOCKET 14 PIN DIP (D-L)	2 ..	
404 0675 000	. SOCKET IC 16 CONT	2 ..	
404 0704 000	. SOCKET IC 20 PIN	1 ..	
404 0776 000	. SOCKET TRANSISTOR TO-3	1 ..	
410 0378 000	. INSULATOR T03	2 ..	
410 0384 000	. INSULATOR #4 SCREW	4 ..	
410 0391 000	. INSULATOR TRANSISTOR T03 ..	2 ..	
430 0030 000	. FAN 115VAC 115CFM 50/60HZ ...	1 ..	
430 0205 000	. FAN 230VAC 260CFM	1 ..	
442 0108 000	. SW,THMOSTAT OPEN 85 DEG C .	1 ..	
484 0296 000	. FILTER RFI POWER LINE	1 ..	
484 0370 000	. FILTER AC LINE 120/250VAC	1 ..	
506 0232 000	. CAP .01UF 100V 5%	3 ..	
506 0243 000	. CAP .15UF 63V 5%	2 ..	
516 0453 000	. CAP .1UF 100V 20%	5 ..	
516 0530 000	. CAP 0.01UF 100V 20%	2 ..	
516 0777 000	. CAP 100PF 50V 10% COG	5 ..	
516 0778 000	. CAP 120PF 50V 10%	2 ..	
516 0859 000	. CAP 470PF 50V 10%	2 ..	
522 0384 000	. CAP 2000UF 25V	2 ..	
522 0391 000	. CAP 1000UF 16V	2 ..	
522 0422 000	. CAP 1000 UF 10V	2 ..	
522 0523 000	. CAP 470UF 16V	1 ..	
522 0524 000	. CAP 10 UF 25V 30%	2 ..	
522 0547 000	. CAP 3300UF 40V-10%, +50%	2 ..	
522 0548 000	. CAP 10UF 50V ELECTROLYTIC ...	2 ..	
522 0566 000	. CAP 100UF 63V 20%	2 ..	
522 0570 000	. CAP 2.2UF 50V	1 ..	
524 0340 000	. CAP 15,000UF 50V	1 ..	
526 0049 000	. CAP 6.8UF 35V 20%	3 ..	
526 0050 000	. CAP 1UF 35V 20%	3 ..	
526 0096 000	. CAP 100UF 10V 20%	2 ..	
526 0097 000	. CAP 47 UF 35V 20%	2 ..	
526 0238 000	. CAP 33UF 35V 20%	1 ..	
526 0311 000	. CAP 2.2UF 35V 10%	4 ..	
526 0351 000	. CAP 6.8UF 50V 20%	2 ..	
526 0362 000	. CAP 10UF 50V 20%	2 ..	
526 0374 000	. CAP 1.0F 5V	1 ..	
526 0376 000	. CAP 10UF 660V	1 ..	
526 0377 000	. CAP 42000UF 60V -10/+75%	1 ..	
540 0018 000	. RES 51.0 OHM 1/2W 5%	1 ..	
548 1487 000	. RES 0.1 OHM 10W 1%	2 ..	

548 1505 000	. RES .2 OHM 10 W 1%	1 .
550 0398 000	. POT 1K OHM 1/2W 10%	1 .
550 0913 000	. POT, 5K OHM	1 .
550 0914 000	. POT, 10K OHM	2 .
550 0921 000	. POT 100K OHM 1/2W	1 .
550 0922 000	. POT 10K OHM 1/2W	1 .
550 0923 000	. POT 1K OHM 1/2W	2 .
550 0927 000	. POT 2K OHM 1/2W	2 .
550 0939 000	. POT 100K OHM 1/2W	1 .
550 1028 000	. POT 20 OHM 1/2W 10%	1 .
550 1069 000	. POT 5K OHM 1/2W	1 .
574 0464 000	. RELAY 24V,6A, SPDT,PC MTG ...	1 .
574 0472 000	. RELAY, 12VDC 8A PC MT	1 .
604 0851 000	. SW, RKR 8PST DIP	1 .
604 0852 000	. SW, RKR DIP 4-SPST	1 .
604 0903 000	. SWITCH, TGL SPDT MOM OFF ...	1 .
604 1091 000	. SWITCH, PB-10 POSITION	1 .
604 1110 000	. SWITCH, PB-6 POSITION	1 .
606 0786 000	. CB 10A 2P 250VAC 50/60HZ	1 .
610 0679 000	. PLUG, SHORTING	3 .
610 0999 000	. HDR, 10 PIN, PC BD	1 .
612 0693 000	. TEST JACK	3 .
612 1184 000	. JUMPER .1" CENTERS	1 .
700 0423 000	. OSC XTAL 10MHZ	1 .
817 2130 007	. FILTER	6 .

R-SB KIT HT 250FM - 994 9219 001

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
992 8119 001	. REGULATOR & DISPLAY BD	1 .	5A2
992 8124 001	. INTERFACE BD	1 .	1A2
992 8125 001	. CONTROLLER BD	1 .	1A1

SECTION VII DIAGRAMS

7.1. Introduction

This section provides schematic, inter-connection, and wiring diagrams required for maintenance of the FM BROADCAST TRANSMITTER. Diagrams are provided in a separate drawing package. Specific diagrams supplied depend upon transmitter configuration ordered.

HT 1FM		HT 500FM		HT 250FM	
Cabinet Outline	839 7909 039	Cabinet Outline	839 7909 033	Cabinet Outline	839 7909 035
	or 839 7909 040		or 839 7909 034		or 839 7909 047
Overall Schematic	843 5135 029	Overall Schematic	843 5135 025	Overall Schematic	843 5135 026
Control Board	839 7909 004	Control Board	839 7909 004	Control Board	839 7909 004
LPFM I/O Board	839 7909 005	LPFM I/O Board	839 7909 005	LPFM I/O Board	839 7909 005
50V DC Supply	839 7909 016	50V DC Supply	839 7909 016	50V DC Supply	839 7909 016
Amplifier Overall	839 7909 050	Amplifier Overall	839 7909 050	Amplifier Overall	839 7909 050
Amplifier RF Part	843 4114 151	Amplifier RF Part	843 4114 151	Amplifier RF Part	843 4979 030
Amp Control Board	839 6337 292	Amp Control Board	839 6337 292	Amp Control Board	839 7832 071
Amp Dir Coupler	829 9135 466	Amp Dir Coupler	829 9135 466	Amp Dir Coupler	829 9135 466