

**TECHNICAL MANUAL  
EXCITER SWITCHER  
COMMON MODE  
992 9843 002  
988-2425-001**

***HARRIS***

T.M. No. 888-2425-001

© Copyright 1997, 2005  
Harris Corporation  
All rights reserved

Printed October 1997  
Revised 01/06/2005

## **Returns And Exchanges**

Damaged or undamaged equipment should not be returned unless written approval and a Return Authorization is received from HARRIS CORPORATION, Broadcast Systems 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 Systems Division, specify the HARRIS Order Number or Invoice Number.

## **Unpacking**

Carefully unpack the equipment 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 all received equipment is not damaged. Locate and retain all PACKING CHECK LISTs. Use the PACKING CHECK LIST to help locate and identify any components or assemblies which are removed for shipping and must be reinstalled. Also remove any shipping supports, straps, and packing materials prior to initial turn on.

## **Technical Assistance**

HARRIS Technical and Troubleshooting assistance is available from HARRIS Field Service during normal business hours (8:00 AM - 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 Systems Division, P.O. Box 4290, Quincy, Illinois 62305-4290, USA. Technical Support by e-mail: [tsupport@harris.com](mailto:tsupport@harris.com). The HARRIS factory may also be contacted through a FAX facility (217/221-7096).

## **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 Systems Division, P.O. Box 4290, Quincy, Illinois 62305-4290, USA. The HARRIS factory may also be contacted through a FAX facility (217/221-7096).

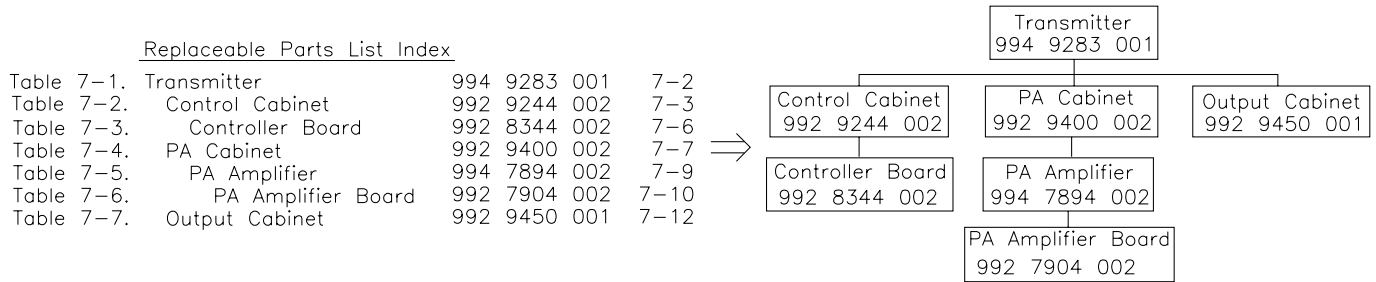
### **NOTE**

The # symbol used in the parts list means used with (e.g. #C001 = used with C001).

## Guide to Using Harris Parts List Information

The Harris Replaceable Parts List Index portrays a tree structure with the major items being leftmost in the index. The example below shows the Transmitter as the highest item in the tree structure. If you were to look at the bill of materials table for the Transmitter you would find the Control Cabinet, the PA Cabinet, and the Output Cabinet. In the Replaceable Parts List Index the Control Cabinet, PA Cabinet, and Output Cabinet show up one indentation level below the Transmitter and implies that they are used in the Transmitter. The Controller Board is indented one level below the Control Cabinet so it will show up in the bill of material for the Control Cabinet. The tree structure of this same index is shown to the right of the table and shows indentation level versus tree structure level.

Example of Replaceable Parts List Index and equivalent tree structure:



The part number of the item is shown to the right of the description as is the page in the manual where the bill for that part number starts.

Inside the actual tables, four main headings are used:

Table #-. ITEM NAME - HARRIS PART NUMBER - this line gives the information that corresponds to the Replaceable Parts List Index entry;

HARRIS P/N column gives the ten digit Harris part number (usually in ascending order);

DESCRIPTION column gives a 25 character or less description of the part number;

REF. SYMBOLS/EXPLANATIONS column 1) gives the reference designators for the item (i.e., C001, R102, etc.) that corresponds to the number found in the schematics (C001 in a bill of material is equivalent to C1 on the schematic) or 2) gives added information or further explanation (i.e., “Used for 208V operation only,” or “Used for HT 10LS only,” etc.).

Inside the individual tables some standard conventions are used:

A # symbol in front of a component such as #C001 under the REF. SYMBOLS/EXPLANATIONS column means that this item is used on or with C001 and is not the actual part number for C001.

In the ten digit part numbers, if the last three numbers are 000, the item is a part that Harris has purchased and has not manufactured or modified. If the last three numbers are other than 000, the item is either manufactured by Harris or is purchased from a vendor and modified for use in the Harris product.

The first three digits of the ten digit part number tell which family the part number belongs to - for example, all electrolytic (can) capacitors will be in the same family (524 xxxx 000). If an electrolytic (can) capacitor is found to have a 9xx xxxx xxx part number (a number outside of the normal family of numbers), it has probably been modified in some manner at the Harris factory and will therefore show up farther down into the individual parts list (because each table is normally sorted in ascending order). Most Harris made or modified assemblies will have 9xx xxxx xxx numbers associated with them.

The term “SEE HIGHER LEVEL BILL” in the description column implies that the reference designated part number will show up in a bill that is higher in the tree structure. This is often the case for components that may be frequency determinant or voltage determinant and are called out in a higher level bill structure that is more customer dependent than the bill at a lower level.



**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 reference:

- 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.**

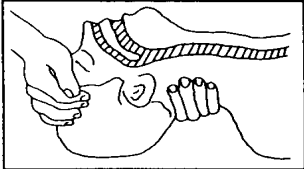
## TREATMENT OF ELECTRICAL SHOCK

1. IF VICTIM IS NOT RESPONSIVE FOLLOW THE A-B-C'S OF BASIC LIFE SUPPORT.

PLACE VICTIM FLAT ON HIS BACK ON A HARD SURFACE

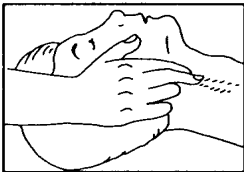
### **(A) AIRWAY**

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**

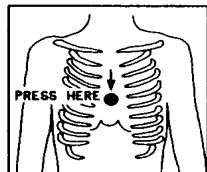
IF NOT BREATHING,  
BEGIN ARTIFICIAL BREATHING



TILT HEAD  
PINCH NOSTRILS  
MAKE AIRTIGHT SEAL  
4 QUICK FULL BREATHS  
REMEMBER MOUTH TO MOUTH  
RESUSCITATION MUST BE  
COMMENCED AS SOON AS POSSIBLE

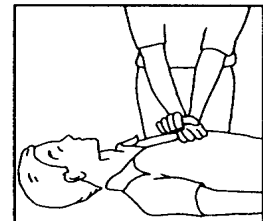
### **(C) CIRCULATION**

DEPRESS STERNUM 1 1/2 TO 2 INCHES



APPROX. RATE  
OF COMPRESSIONS { ONE RESCUER  
--80 PER MINUTE { 15 COMPRESSIONS  
2 QUICK BREATHS

APPROX. RATE  
OF COMPRESSIONS { TWO RESCUERS  
--60 PER MINUTE { 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.

- KEEP THEM WARM
- KEEP THEM AS QUIET AS POSSIBLE
- LOOSEN THEIR CLOTHING
- 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)

# Table of Contents

---

<b>Section I</b>	TIMING SYNC . . . . .	3-1
<b>Introduction/Specifications</b>	SOUND 1 IF LOW . . . . .	3-1
Introduction . . . . .	SOUND 2 IF LOW . . . . .	3-1
Product Description . . . . .		
Specifications . . . . .		
	<b>Section IV</b>	
<b>Section II</b>	<b>Overall System Theory</b>	
<b>Installation</b>	General Description . . . . .	4-1
Introduction . . . . .	Detailed Description . . . . .	4-1
Remote Control . . . . .	Exciter Switcher Main PWB . . . . .	4-1
Configuration . . . . .	Drive Amplifier . . . . .	4-2
<b>Section III</b>	<b>Section V</b>	
<b>Operators Guide</b>	<b>Adjustments</b>	
Introduction . . . . .	Intruduction . . . . .	5-1
Operating Procedures . . . . .	Jumper Settings . . . . .	5-1
ON AIR EXCITER SELECT . . . . .	RF Level Detectors . . . . .	5-1
AUTO / MANUAL SELECT . . . . .	Checking Front Panel Indicators . . . . .	5-1
REMOTE CONTROL . . . . .		
Fault Indicators . . . . .		
RF LOW . . . . .		
VISION IF LOW . . . . .		
	<b>Section VI</b>	
	<b>Parts List</b>	
	<b>Section VII</b>	
	<b>Drawings</b>	



## 1.1 Introduction

This technical manual describes the Harris 992 9843 002 UHF Television exciter switcher. This switcher is installed in transmitters which include two exciters, so that either one may be selected as the on-air exciter.

This version of the exciter switcher is used in Sigma™ series transmitters operating in common amplification mode (visual and aural signals combined in the exciter). Exciter selection may be either manual or automatic.

The manual includes a set of drawings for the exciter switcher and is a complete guide to installation, use and servicing of the product. The following sections are included in this manual:

- Section I: Introduction/Specifications is an overall description of the exciter switcher and the technical manual.
- Section II: Installation/Initial Turn-on provides the information needed to install the switcher and make any needed connections to it.
- Section III: Operator's Guide describes all controls and indicators and the operating procedures for the switcher.
- Section IV: Overall System Theory explains the inner workings of the switcher in detail, referring to the drawing set for illustrations.
- Section V: Adjustments includes descriptions of adjustments and servicing procedures.
- Section VI: Parts List identifies all components of the switcher which might ever be needed for servicing the product.
- Section VII: Drawings is a list of the drawings included in the separate drawing set accompanying this technical manual.

## 1.2 Product Description

Refer to Figure 1-1, Exciter Switcher Block Diagram.

The exciter switcher is housed in a rackmount chassis which is installed in the control cabinet along with the exciters. Signal outputs from both exciters are connected to the switcher and one exciter's output is selected and sent to the transmitter. Output from the reserve exciter is terminated in the exciter switcher.

Fault detection circuits in the exciter switcher monitor the levels of both exciter outputs and certain fault signals from both exciters. Front panel indicator lights on the switcher signal low levels or fault conditions.

A front panel ON AIR EXCITER SELECT switch allows an operator to change exciters. An AUTO / MANUAL SELECT switch permits the operator to choose whether exciter selection is by manual operation or automatic, due to a fault in the selected exciter.

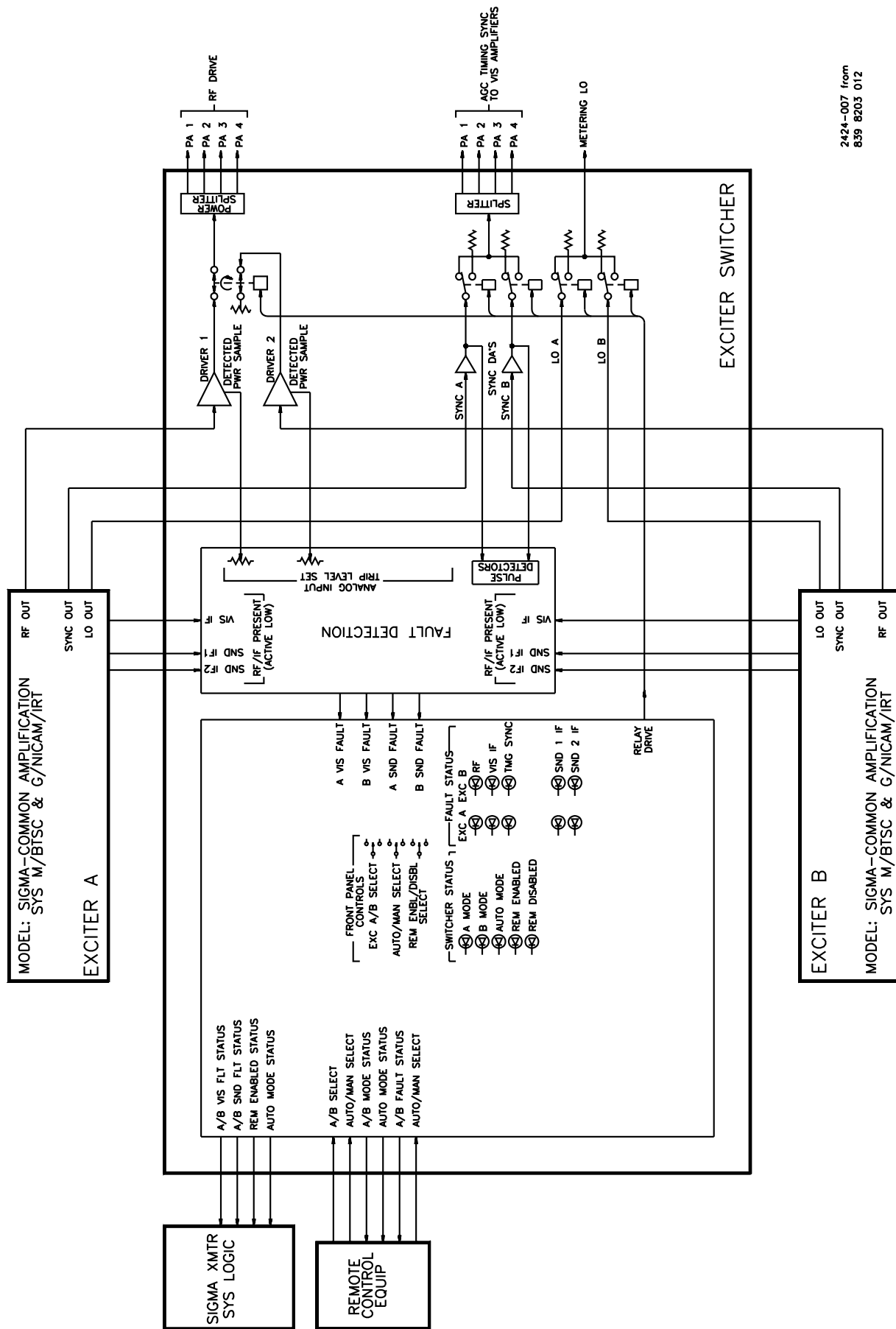
The REMOTE CONTROL switch may be used to enable or disable control of the exciter switcher by controls located away from the transmitter.

## 1.3 Specifications

### NOTE

*Specifications subject to change without notice.*

Table 1-1 gives specifications for UHF Exciter Switcher 992 9843 002.



2424-007 from  
839 8203 012

Figure 1-1. Block Diagram, Exciter Switcher

Table 1-1

Frequency Range	470 MHz to 860 MHz
<b>INPUTS</b>	
Max Level	+5 dBm peak sync
Impedance	50 Ohms
Return Loss	-20dB or better
<b>LO Inputs</b>	
Max Level	+20dbm
Impedance	50 Ohms
Return Loss	-10dB or better
<b>Timing Sync</b>	
Max Level	+1 Volt
Impedance	75 Ohms
<b>OUTPUTS</b>	
<b>RF</b>	
Max Level	+12dbm Peak Sync
Impedance	50 Ohms
Freq Response	0.5dB variation or less over one channel
Throughput Gain	0.5dB +/-1dB
Diff Gain	1% or less
Diff Phase	0.5 degree or less
ICPM	0.5 degree or less
LFL	1% or less
<b>LOCAL OSCILLATOR (LO):</b>	
Impedance	50 Ohms
Throughput Loss	-2.5dB Typical
<b>TIMING SYNC:</b>	
Level	+1 Volt terminated in 75 Ohms
Impedance	75 Ohms
<b>AUTO SWITCH FAULTS:</b>	
Delay Before Auto Switch	Approximately 1 second
External Fault Signal Activation	Release of active low input. Active low must sink 5ma to 2V or less for normal operation. Upon release, fault line pulled up to +12V internally
Internal Fault Signal Activation (Analog RF Level)	0-1VDC. Developed within internal RF booster amplifier
Faults (externally sensed except where noted)	RF Pwr (internal)
	Vis IF
	Snd 1 IF
	Snd 2 IF
	Timing Sync
<b>REMOTE CONTROL:</b>	
Remote Command Signal	Requires momentary active low signal 100mS to 1 second in duration. Active low signal must sink 5mA to 2VDC or less from internal +12VDC pullup.
Remote Status	Switcher provides active low open collector output capable of sinking 30VDC @ 350mA to 1.6V.

**Table 1-1  
Continued**

<b>POWER REQUIREMENTS:</b>	
Regulation	All voltages: Less than 1%
Hum & noise	All voltages: -50dB or better
Power	+12VDC@1A
	-12VDC@50mA
	Bus A: +24VDC @350mA
	Bus B: +24VDC @350mA
<b>CONNECTORS:</b>	
RF/LO/Sync Inputs and Outputs:	BNC Female
Exciter Interface X1/X2:	DB9F
Transmitter Logic Interface:	DB9F
Remote Control:	DB25M
Power (J9):	9 Pin Male (Mates to AMP 1-640520-0)
<b>PHYSICAL:</b>	
Front Panel	
Width:	19"
Height:	3.47"
<b>CHASSIS</b>	
Width:	16.75"
Height:	3.2"
Depth:	23.25"
Overall Depth:	24.75"

## 2.1 Introduction

Installation of the Exciter Switcher is normally done when the transmitter is assembled in the factory. Exciters and exciter switcher are not removed for shipment, so they should require no action to reinstall when your transmitter arrives. If your particular shipping requirements have caused some of these units to be removed for shipment they should be unpacked, identified and placed in their rack locations in the control cabinet, connecting the installed cables to the backs of the units.

Figure 2-1 is a drawing of the rear panel of the exciter switcher showing the location of all connectors.

and status signals output by the switcher (signalling the state of the switcher or one of its inputs).

### *Remote Command Signal*

These inputs requires momentary active low signals, 100mS to 1 second in duration. The remote control circuits must sink 5mA to 2VDC or less from the switcher internal +12VDC pullup.

### *Remote Status*

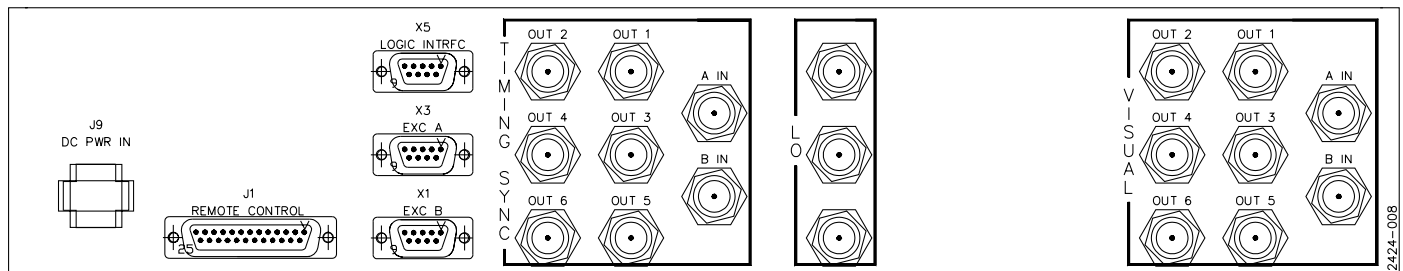
The switcher provides active low open collector outputs capable of sinking 30VDC @ 350mA to 1.6V.

## 2.2 Remote Control

Remote control connections to the exciter switcher are connected to J1, a DB25 female connector. The connections are listed on drawing 839 8203 013, Wiring Diagram. The remote connections consist of command signals (causing an action in the switcher)

## 2.3 Configuration

Configuration of the exciter switcher is normally done in the factory when the switcher is assembled into and tested with the transmitter. If a switcher is installed at a later date, consult Drawing 839 8203 001, Sheet 5 for a table of jumper settings for all versions of the switcher.



**Figure 2-1**  
**Rear View of Exciter Switcher**



## 3.1 Introduction

The Sigma™ exciter switcher is installed in the transmitter System Control Cabinet between the exciters. The exciter front panel is shown in Figure 3-1.

## 3.2 Operating Procedures

The exciter switcher controls are center-off lever switches which can be pressed momentarily to the left or to the right.

### 3.2.1 ON AIR EXCITER SELECT

This switch is used to choose either Exciter A or Exciter B. Indicator lamps next to the switch show the current selection.

### 3.2.2 AUTO / MANUAL SELECT

This switch is used to choose the mode of operation of the exciter switcher.

- MANUAL indicates control is only by the ON AIR EXCITER SELECT switch (or by remote command).
- AUTO indicates the switcher will also be controlled by fault signals from the exciters and will switch to the reserve exciter if any fault occurs in the selected exciter. (To avoid unwanted switching due to minor transient interruptions, the exciter switcher waits for one second before performing an automatic switch).

An AUTO indicator lamp next to the switch lights when the switcher is in the AUTO mode.

### 3.2.3 REMOTE CONTROL

This switch is used to enable control of the switcher from a point outside the transmitter.

Indicator lamps next to the switch show whether the switcher's remote control is enabled or disabled.

When in DISABLE, only the switcher front panel ON AIR EXCITER SELECT and AUTO / MANUAL SELECT switches

control the exciter switcher. When in ENABLE, the remote-connected controls can also control the switcher.

## 3.3 Fault Indicators

The EXCITER FAULT indicators at the center of the panel light to signal faults which can cause the switcher to change to the alternate exciter when in AUTO mode.

If the reserve exciter is faulted, a fault in the selected exciter cannot cause a switch.

In either MANUAL or AUTO mode, the indicators signal the fault condition to the operator.

### 3.3.1 RF LOW

An internal detector in the switcher is used to signal a fault if the exciter RF level is 3dB or more lower than the level required to produce 100% output power from the transmitter.

### 3.3.2 VISION IF LOW

This fault indicates a vision IF low signal is being received from the exciter.

### 3.3.3 TIMING SYNC

This fault indicates the normal timing sync signal from the exciter, used by the transmitter for AGC operation, has been interrupted.

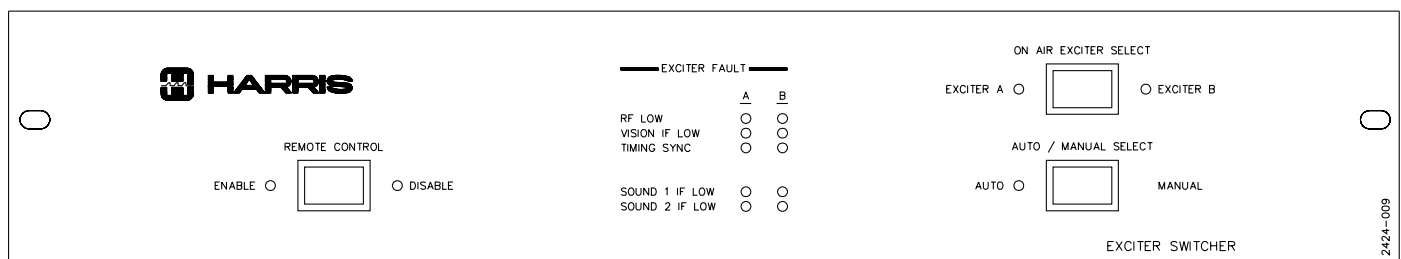
### 3.3.4 SOUND 1 IF LOW

This fault indicates a sound 1 IF low signal is being received from the exciter.

### 3.3.5 SOUND 2 IF LOW

(Used only in PAL and other transmission systems which use two sound carriers.)

This fault indicates a sound 2 IF low signal is being received from the exciter.



**Figure 3-1**  
**Front View of Exciter Switcher**





### 4.1 General Description

The Sigma PLUS™ transmitter exciter switcher is included in the control cabinet when two exciters are installed. The switcher selects one of the exciters to supply signals to the transmitter and connects an appropriate dummy load to the unused exciter. Switching control may be manual, but may also be selected to AUTO. When in AUTO mode, the reserve exciter is selected automatically when the on-air exciter fails.

The exciter switcher is constructed in a 24.75" deep chassis 2 rack units (3.47") high and 19" wide to be rackmounted in the transmitter control cabinet. Inside are driver amplifiers, a coaxial switch and relays, and the Main PWB which contains the control logic and fault detection for the switcher. A separate "breakaway" PWB containing the control switches and indicators is mounted to the rear of the front panel. (A breakaway board is a small section of a larger circuit board which is separated from it during manufacture.)

Power for the exciter switcher is supplied from the control cabinet power supplies.

The connections between the exciter switcher, the exciters and the transmitter are shown in the exciter switcher block diagram - see 839 8203 012, Block Diagram, Exciter Switching system.

Visual and aural RF outputs from both exciters are connected to driver amplifiers in the exciter switcher. The driver amplifiers increase the signal levels sufficiently to produce the needed drive levels for the transmitter. The driver amplifier outputs are then delivered to a switching relay which selects one exciter's signal and terminates the reserve exciter's signal.

The selected exciter signal from the relay is fed to a signal splitter which divides the outputs into the number of feeds needed to drive all the PA amplifiers. Local Oscillator and sync outputs from both exciters are also selected by relay circuits, with the selected LO signal routed from the switcher to the transmitter circuits. No drive amplifiers are used in the switcher for the LO signals.

The RF drive amplifiers contain detectors which provide signal samples to the fault detection logic in the switcher. AGC timing sync signals from the exciters are buffered on the switcher main board and samples of the buffer outputs are delivered to sync presence detectors on the board.

Sound IF 1 and Sound IF 2 fault outputs from the exciters are also fed to the fault detection logic. These signals are all monitored by the fault detection circuits and used to produce fault lights on the front panel if any of the signals is in the faulted state. When the switcher is operated in the AUTO mode, a fault from any of these signals from the selected exciter causes the switcher to switch, placing the reserve exciter on the air.

In addition to the selected output signals from the switcher, the unit also delivers to the transmitter logic the current fault status

of each exciter, the Remote/Local status and the Auto/Manual status of the switcher.

### 4.2 Detailed Description

Refer to 839 8203 013, Wiring Diagram, UHF Exciter Switcher, Sigma Exc., Int Diplexed.

The visual and aural inputs from both exciters at J20 & J21 are fed through 3dB matching attenuators and then drive amplifiers A1 & A2. DC samples for the drive amplifier output levels are developed within the drive amplifiers, and are fed to the Main PWB and delivered to fault logic through Main PWB J5 and J6.

The outputs of A1 and A2 are fed to K1, where one signal is selected as the transmitter RF source and fed through splitter SPL-1 to J24 - J27 to drive up to 4 transmitter PA cabinets. A 50 ohm termination at K1 terminates the unused exciter output.

The AGC timing sync inputs from each exciter to the exciter switcher at J30 and J31 are fed to J30 and J31 on the Main board and to drive amplifiers on the board. The board selects one of the sync signals and delivers up to 4 sync outputs (Main PWB J32 - J35) which are used in the PA amplifier AGC circuits. (If additional components are installed, up to 6 timing sync outputs can be provided.)

Local Oscillator (LO) outputs from the exciters at J38 & J39 are fed to the Main PWB and switched by an on-board relay. The selected LO signal at Main PWB J40 is output from the exciter switcher at J40 to supply LO to the transmitter monitor board.

DC power from the control cabinet power supplies are fed by switcher J9 and main PWB J9.

Fault status connections from the exciters are input at X1 and X3, and status and control interconnections with the transmitter are connected at X5. The connections from all three of these connectors are routed to Main PWB J8. Remote control connections from J1 are routed through to Main PWB J1.

The front panel PWB switches and indicators are connected to the main PWB by Front Panel Breakoff PWB J10A and Main PWB J10.

### 4.3 Exciter Switcher Main PWB

Refer to 839 8203 001, Schematic, Exciter Switcher.

#### *Sheet 1*

The exciter switcher Main PWB is constructed with a breakoff section which becomes the Front Panel PC Assembly during manufacture. When installed in the switcher, a 34 pin ribbon cable interconnects J10A on the Front Panel PC Assembly with J10 on the Main PWB. The Front Panel PC Assy consists of switches, indicators, indicator drivers and pullup resistors.

### Sheet 2

Analog RF level samples from the RF drive amplifiers are fed to level comparators to sense and detect insufficient level in any of the signals. The circuits for the 2 signals are identical. Using the RF A (Vis A) sample as an example, the DC sample from the drive amplifier is input at J5-5 and fed to U20. U20 compares the sample level with the calibrate level from R69, producing a High if the sample is above the reference level and a Low if the sample is below it. U18 is a schmidt trigger inverter which will produce a digital level output change in the presence of an analog ramp signal on the input.

JP15 may be set to use this output (JP15, 2/3) or to use the opto-coupled input from an external detector (JP15, 1/2).

Other externally-generated exciter status signals are input via opto-coupling, and each is either selected or forced to a permanent Low (JP6 - 10, JP12 - 14).

Exciter A and B timing sync are input from Sheet 4 and presence-detected. Using the exciter A sample as an example, U12 is repeatedly retriggered by the exciter timing sync and is held in the On state unless sync is not detected. U2-6 goes Low to signal sync loss. This loss of sync fault can be routed to the summary fault logic by JP5 (Exciter A) or by JP11 (Exciter B).

Summary fault logic gates U13 (Exciter A) and U14 (Exciter B) receive all exciter faults selected by the jumpers noted above. A and B fault status are output from the board on J8 and are routed as exciter fault status by AND gates U10. Exciter A and B fault status are output on J1 and are also routed to Sheet 3 as A Fail and B Fail.

### Sheet 3

A Fail and B Fail from Sheet 2 are routed to gates U5. A Fail is connected direct to U5-8, inhibiting an automatic switch to A as long as the A Fail signal remains Low.

A Fail is also routed to U5-4 through delay and inversion circuit R18, C7 and U4. This signal changes from a Low to a High after one second of continuous fault, causing U5-6 to send a B select command to U2.

The B select command will not be sent by U5 if:

- B Fail is also already Low.
- MANUAL at pin 5 is Low.

U2 can receive an A Select or B Select command from either the front panel switch or from a remote control device by way of opto Couplers U7 and Gates U6. Gates U3 send AUTO and MANUAL commands, either from the front panel switch or from a remote device by way of U7 and U6.

U6 will only pass remote commands if in Remote mode. Front panel REMOTE CONTROL switch sends commands to enable or disable remote.

The commands are routed to Q1 - Q6 to operate magnetically latched relays. K3 selects A or B, K4 selects AUTO or MANUAL

and K5 selects Remote or Local. Selecting REMOTE does not disable the local controls; selecting AUTO does not diable the ON AIR EXCITER SELECT control.

U4 and Q7 are a holdoff circuit which prevents spurious logic signals from changing the state of K3, K4 or K5 when power is turned on. This is done by holding all the FET gates clamped to ground for approximately 1 second after power is applied.

J7 outputs the control leads to the Visual and Sound coaxial transfer relays in the switcher chassis.

JP1 and JP2 select either the on-board relay or the larger coaxial switches in the chassis as the source of A MODE and B MODE status signals.

Gates U3 combine the Visual and Sound MODE signals; when common amplification is used JP3 is used to force the unused Sound inputs to the gates to a High.

### Sheet 4

On-board relays K7 - K10 select control, status and interface signals from Exciter A or Exciter B to common control or status lines representative of the on-air exciter.

K1 and K2 are used to select the exciter LO signal.

Timing sync from the exciters is input at J30 and J31. The sync is amplified in U15 and U16 and routed to K6.

K6 selects timing sync from Exciter A or Exciter B and routes it to output connectors J32 - J37 through 75 ohm source resistors.

JP4 is used to select internal or external equalization reset to digital CD 1<sup>TM</sup> exciters in digital transmitter systems.

### Sheet 5

This sheet is devoted primarily to power distribution and documentation of unused device sections, but also contains a chart of jumper settings for the Main PWB for use in this and other versions of the exciter switcher.

---

## 4.4 Drive Amplifier

Refer to 843 5466 691, Schematic, Exciter Switcher Amplifier.

The amplifier is used with Sigma<sup>TM</sup> exciters to raise the level of exciter signals passing through the switcher and to detect a sample of the RF level for use in the exciter automatic switching circuits.

RF input to the amplifier is isolated by a resistive pad and then amplified by U1. The output from U1 is delivered to the amplifier output through a directional coupler whose output is detected by RF detector CR2. The detected voltage is amplified by U2, with temperature correcting voltage supplied to the other input to U2 from an identical detector diode which has no RF applied.

There are no adjustments in the amplifier.

---

## 5.1 Intruduction

The exciter switch is an accessory for the exciters used when a dual-exciter system is installed. The exciter switcher has very few adjustments.

All of the exciter adjustments are located on the switcher Main Board. If difficulty is encountered locating any component on the board, refer to Drawing 839 8203 002, Component Locator, Exciter Switcher.

---

## 5.2 Jumper Settings

Jumpers on the switcher main Board are used to configure the switcher in the system. The jumpers are set when the switcher is installed during manufacture. Should it become necessary to change a jumper, refer to drawing 839 8203 001 to determine the correct settings. The jumper settings chart on Sheet 5 gives the correct jumper settings for each application of the exciter.

---

## 5.3 RF Level Detectors

The exciter switcher includes RF drive amplifiers when used with the Sigma™ exciter. The amplifiers include RF output level detectors which deliver samples to the exciter switcher main board. On the main board, threshold detectors should be set to generate FAULT signals when each level is reduced in the exciter to 3dB below the normal level required to produce 100% output power from the transmitter. The controls used to set the threshold levels are:

Exciter A: R69 VIS A SWITCH LEVEL SET  
Exciter B: R70 VIS B SWITCH LEVEL SET

### *Adjustment Procedure*

The method used for each detector is the same.

- a. Select the exciter switcher to MANUAL and select Exciter A.
- b. Set Exciter A to produce 50% Visual power.
- c. Turn R69 fully CW and then turn it CCW until the A VISION RF LOW light just turns on.
- d. Return A Visual and Sound powers to 100% and select Exciter B.
- e. Repeat the previous procedure for VIS B.
- f. Return B to 100%.

This procedure has set the switcher to sense low RF levels and generate a fault if an output falls below 50%. If a different sensing level is desired, substitute that level for 50% in the above procedure.

Once these adjustments are made and the switcher has been returned to AUTO mode, if either the RF output of the selected exciter drops below the set level the reserve exciter will be selected. Switching will not take place if there is a fault reported from the reserve exciter.

---

## 5.4 Checking Front Panel Indicators

If a faulty front panel indicator is suspected, a method has been provided to check the indicators. Momentary switch S4, located on the Front Panel PC Assembly and accessible from the rear of the board, inside the switcher, lights all of the LED indicators when pressed.



## Section VI Parts List

**Table 6-1. SWITCHER, EXCITER, SIGMA UHF - 992 9843 002 (K)**

<i>Harris PN</i>	<i>Description</i>	<i>QTY UM</i>	<i>Reference Designators</i>
296 0253 000	TUBING, SHRINK 3/16 WHITE	0.210	FK001
356 0208 000	CLAMP, FLAT CABLE 2"	1 EA	
356 0214 000	CLAMP, FLAT CABLE 1 IN.	1 EA	
358 2598 000	CABLE TIE MOUNT, 4-WAY	4 EA	
358 3190 000	PLUG, WHT .500" HOLE	2 EA	
358 3223 000	FEMALE SCREWLOCK .56"4-40	4 EA	
358 3579 000	SLIDES, DRAWER	1 PR	
448 1101 000	HANDLE, ALUMINUM, BLACK	2 EA	
556 0143 000	ATTEN, FIXED, 3DB 1/2W SMA	2 EA	AT-1 AT-2
583 0152 000	RELAY, COAX TRANSFER	1 EA	K001
598 0470 000	FRAME, SNAP-IN, BLACK	3 EA	#S001,#S002,#S003
620 2965 000	POWER SPLITTER, 4-WAY	1 EA	SPL-1
646 0665 000	INSPECTION LABEL	1	
700 1376 000	TERMINATION, 75 OHM BNC	3 EA	R007,R008,R009
700 1404 000	TERMINATION, 50 OHM 0.25W BNC	4 EA	R003,R004,R005,R006
700 1405 000	TERMINATION, 50 OHMS 2W	1 EA	R001
839 8203 012	BLOCK DIAG,EXC SWITCHER SYSTEM	0	
839 8203 013	WIRING DIAG, EXCITER SWITCHER	0	
917 2510 019	CABLE PKG, SIGMA, INT DIPLEXED	1 EA	
939 8203 023	CHASSIS, EXC/SW, SIGMA EXC	1 EA	
939 8203 024	COVER, EXC/SW, SIGMA EXC	1 EA	
939 8203 027	ANGLE, MINI CKT MTG.	1 EA	
939 8203 030	COVER, REAR, D-SUBS	1 EA	
939 8203 031	COVER, REAR, SOUND	1 EA	
939 8203 042	PNL, FRT, EXC/SW W/COMMON AMP	1 EA	
988 2425 001	DP, EXCITER SWITCHER COMMON	2	
992 9843 008	PWA, EXCITER SWITCHER	1 EA	
992 9846 003	AMPLIFIER, UHF, 27DBM	2 EA	A001,A002
999 2900 001	HARDWARE LIST,EXCITER SWITCHER	1 EA	

**Table 6-2. PWA, EXCITER SWITCHER - 992 9843 008 (C)**

<i>Harris PN</i>	<i>Description</i>	<i>QTY UM</i>	<i>Reference Designators</i>
296 0310 000	TUBING TEFLON 20 AWG	1.560	FT
384 0903 000	LED, RED, T-1 ESD	8 EA	DS011,DS012,DS014,DS015,DS017,DS018,DS020,DS021
839 8203 001	SCH, EXCITER SWITCHER PWB	0	
839 8203 002	LAYOUT, COMPONENT,	0	
992 9843 006	PWA, EXCITER SWITCHER, DTV	1 EA	

**Table 6-3. PWA, EXCITER SWITCHER, DTV - 992 9843 006 (J)**

<i>Harris PN</i>	<i>Description</i>	<i>QTY</i>	<i>UM</i>	<i>Reference Designators</i>
296 0310 000	TUBING TEFLON 20 AWG	0.730		FT
358 1928 000	JUMPER 1/4 LG 1/8H	4	EA	JP019,JP020,JP021,JP022
380 0773 000	XSTR FET BS170 N-CHL ESD	7	EA	Q001,Q002,Q003,Q004,Q005,Q006,Q007
382 0288 000	IC, 4011/14011 ESD	1	EA	U006
382 0302 000	IC, 4023/14023 ESD	2	EA	U002,U005
382 0367 000	IC, 4049/14049 ESD	1	EA	U009
382 0414 000	IC, CD4002/MC14002 ESD	2	EA	U013,U014
382 0594 000	*IC TL074ACN ESD	1	EA	U011
382 0618 000	IC, 4081/14081 ESD	2	EA	U003,U010
382 0719 000	IC LM324AN ESD	1	EA	U020
382 1070 000	IC, ILQ-1 OPTO-ISOLATOR ESD	4	EA	U007,U022,U023,U024
382 1192 000	IC, MC14584BCP ESD	2	EA	U004,U018
382 1210 000	IC CD4538B ESD	1	EA	U012
382 1629 000	IC ULN2804 ESD	5	EA	U001,U008,U017,U019,U021
383 0302 000	IC, LT1206CR ESD	2	EA	U015,U016
384 0205 000	DIODE SILICON 1N914/4148 ESD	45	EA	CR001,CR002,CR003,CR004,CR005,CR010,CR011,CR012,CR013,CR014,CR015,CR016,CR017,CR018,CR019,CR020,CR021,CR022,CR023,CR024,CR025,CR026,CR027,CR028,CR029,CR030,CR031,CR032,CR033,CR034,CR035,CR036,CR051,CR052,CR053,CR054,CR055,CR056,CR057,CR059,CR060,CR061,CR062,CR063,CR064
384 0597 000	RECT 1N4002 ESD	18	EA	CR006,CR007,CR008,CR009,CR037,CR038,CR039,CR040,CR041,CR042,CR043,CR044,CR045,CR046,CR047,CR048,CR049,CR050
384 0660 000	DIODE, REFERENCE ESD	1	EA	CR058
384 0837 000	TRANSZORB 1N6376 12V 5W ESD	2	EA	CR065,CR066
384 0903 000	LED, RED, T-1 ESD	3	EA	DS010,DS016,DS027
384 0904 000	LED, GRN, T-1 ESD	7	EA	DS001,DS004,DS006,DS009,DS024,DS025,DS026
384 0961 000	LED, YELLOW ESD	7	EA	DS002,DS003,DS005,DS007,DS008,DS022,DS023
404 0674 000	SOCKET, DIP, 14 PIN (DL)	11	EA	XU002,XU003,XU004,XU005,XU006,XU010,XU011,XU013,XU014,XU018,XU020
404 0675 000	SOCKET, DIP, 16 PIN (DL)	6	EA	XU007,XU009,XU012,XU022,XU023,XU024
404 0766 000	SOCKET, DIP, 18 PIN (DL)	5	EA	XU001,XU008,XU017,XU019,XU021
404 0824 000	SOCKET, DIP14, LO PROFILE	8	EA	XK007A,XK007B,XK008A,XK008B,XK009A,XK009B,XK010A,XK010B
404 0825 000	SOCKET, DIP16, LO PROFILE	4	EA	XK003,XK004,XK005,XK006
516 0453 000	CAP .1UF 100V 20% X7R	13	EA	C006,C008,C009,C011,C012,C013,C014,C017,C018,C019,C020,C028,C032
516 0530 000	CAP .01UF 10% 100V X7R	16	EA	C001,C002,C003,C004,C016,C021,C023,C024,C025,C026,C027,C029,C030,C031,C033,C034
516 0736 000	CAP .001UF 10% 100V X7R	2	EA	C037,C038
522 0548 000	CAP 10UF 50V 20%	1	EA	C035
522 0550 000	CAP 100UF 25V 20%	5	EA	C005,C007,C010,C036,C039
522 0570 000	CAP 2.2UF 50V 20%	2	EA	C015,C022
540 1372 000	RES NETWORK 680 OHM 2%	3	EA	R047,R048,R049
540 1416 000	RES NETWORK 10K OHM 2%	6	EA	R021,R023,R064,R066,R068,R072
540 1430 000	RES NETWORK, 10K OHM 2%	3	EA	R012,R017,R092
540 1437 000	RES NETWORK 2000 OHM 2%	3	EA	R028,R065,R071
545 0309 118	RES 51.1 OHM 1% 1/4W 1206	2	EA	R001,R002
548 2051 000	RES ZERO OHM	2	EA	R039,R052

548 2400 156	RES 37.4 OHM 1/2W 1%	2	EA	R032,R033
548 2400 185	RES 75 OHM 1/2W 1%	6	EA	R029,R030,R031,R036,R046,R054
548 2400 269	RES 511 OHM 1/2W 1%	1	EA	R087
548 2400 285	RES 750 OHM 1/2W 1%	4	EA	R037,R038,R050,R051
548 2400 301	RES 1K OHM 1/2W 1%	15	EA	R003,R004,R005,R006,R007,R008,R009,R011,R024,R041,R042,R053,R059,R075,R091
548 2400 330	RES 2K OHM 1/2W 1%	5	EA	R076,R077,R078,R079,R080
548 2400 342	RES 2.67K OHM 1/2W 1%	1	EA	R067
548 2400 368	RES 4.99K OHM 1/2W 1%	8	EA	R013,R014,R015,R016,R026,R027,R040,R043
548 2400 380	RES 6.65K OHM 1/2W 1%	2	EA	R018,R020
548 2400 401	RES 10K OHM 1/2W 1%	19	EA	R010,R025,R034,R035,R044,R045,R056,R057,R060,R062,R081,R082,R083,R084,R085,R086,R088,R089,R090
548 2400 701	RES 10MEG OHM 1/2W 1%	4	EA	R055,R058,R061,R063
550 0913 000	POT, 5K OHM, 1/2W	4	EA	R069,R070,R073,R074
574 0477 000	RELAY 4 PDT 12VDC 2 AMP	4	EA	K007,K008,K009,K010
574 0485 000	RELAY DPDT 12VDC 2 AMP	3	EA	K003,K004,K005
578 0026 000	RELAY DPDT 12VDC 2 AMP	1	EA	K006
578 0029 000	RELAY 12V SPCO RF SW PCB	2	EA	K001,K002
604 1147 000	SW PB SPST-N.O. MOM	1	EA	S004
604 1205 000	SW, SPDT MOMENTARY	3	EA	S001,S002,S003
610 0827 000	*HEADER, 20C TWO ROW VERTICAL	1	EA	J004
610 0828 000	*HEADER, 26C TWO ROW VERTICAL	4	EA	J001,J002,J003,J008
610 0830 000	*HEADER, 10C TWO ROW VERTICAL	1	EA	J007
610 0855 000	*HEADER, 34C TWO ROW VERTICAL	2	EA	J010,J010A
610 0900 000	HEADER 3 CKT STRAIGHT	18	EA	JP001,JP002,JP003,JP004,JP005,JP006,JP007,JP008,JP009,JP010,JP011,JP012,JP013,JP014,JP015,JP016,JP017,JP018
610 0933 000	JUMPER, PWB TEST POINT	10	EA	TP001,TP002,TP003,TP004,TP005,TP006,TP007,TP008,TP009,TP010
610 0950 000	PIN HEADER 6 PIN	1	EA	J009
610 1304 000	*HEADER, 16C TWO ROW VERTICAL	2	EA	J005,J006
612 1184 000	SHUNT JUMPER 0.1" CENTERS	18	EA	XJP001 XJP002 XJP003 XJP004 XJP005 XJP006 XJP007 XJP008 XJP009 XJP010 XJP011 XJP012 XJP013 XJP014 XJP015 XJP016 XJP017 XJP018
620 0700 000	*RECPT, MALE SMB,PC MOUNT	9	EA	J030,J031,J032,J033,J034,J035,J038,J039,J040
839 8203 001	SCH, EXCITER SWITCHER PWB	0		
839 8203 002	LAYOUT, COMPONENT,	0		
839 8203 003	PWB, EXCITER SWITCHER	1		

**Table 6-4. AMPLIFIER, UHF, 27DBM - 992 9846 003 (B)**

<i>Harris PN</i>	<i>Description</i>	<i>QTY</i>	<i>UM</i>	<i>Reference Designators</i>
358 1214 000	SCREWLOCK, FEMALE	1	EA	#J3 SEND WITH UNIT TO TEST
358 2772 000	STANDOFF 6-32 X 3/4	4	EA	
382 1697 000	IC, MHW9187 ESD	1	EA	U001
404 0934 000	PAD, THERMAL INTERFACE	1	EA	#U001
610 1288 000	PLUG 9 PIN	1	EA	J003
939 8203 020	COVER, EXC/SW AMP	1	EA	
992 9846 004	PWA, UHF AMP, EXC SWITCHER SMT	1	EA	
302 0054 000	SCR, 4-40 X 3/8	2	EA	#J003
302 0105 000	SCR, 6-32 X 5/16	4	EA	4/COVER
302 0109 000	SCR, 6-32 X 5/8	2	EA	#U001

310 0003 000	WASHER, FLAT NO. 4	2	EA	#J003
310 0012 000	WASHER FLAT 6	4	EA	4/STANDOFFS
312 0005 000	WASHER, INT LOCK 6	2	EA	#U001 2/U001
314 0003 000	WASHER, SPLIT-LOCK 4	2	EA	#J003
314 0005 000	WASHER, SPLIT-LOCK 6	8	EA	4/COVER 4/STANDOFFS

**Table 6-5. PWA, UHF AMP, EXC SWITCHER SMT - 992 9846 004 (A)**

<i>Harris PN</i>	<i>Description</i>	<i>QTY UM</i>		<i>Reference Designators</i>
383 0253 000	IC, LM358 ESD	1	EA	U002
385 0027 000	DIODE, 2800 SCHOTTKY SMT ESD	2	EA	CR001,CR002
515 0046 000	*CAP 100PF 50V 5% 1206 COG	5	EA	C004,C008,C012,C013,C014
515 0052 000	*CAP 330PF 50V 5% 1206 COG	2	EA	C001,C002
515 0084 000	*CAP .01UF 50V 10% 1206 X7R	1	EA	C011
515 0137 501	CAP 0.1UF 50V 10% 1206 X7R	2	EA	C009,C010
515 0139 601	CAP 1UF 50V 20% 1812 Z5U	3	EA	C005,C006,C007
545 0121 000	RES 1M OHM 1/4W 5% 1206	4	EA	R005,R014,R017,R018
545 0309 021	RES 6.81 OHM 1% 1/4W 1206	1	EA	R011
545 0309 118	RES 51.1 OHM 1% 1/4W 1206	1	EA	R012
545 0309 122	RES 75 OHM 1% 1/4W 1206	2	EA	R002,R022
545 0309 201	RES 100 OHM 1% 1/4W 1206	4	EA	R007,R010,R013,R016
545 0309 212	RES 301 OHM 1% 1/4W 1206	4	EA	R001,R003,R021,R023
545 0309 418	RES 51.1K OHM 1% 1/4W 1206	2	EA	R004,R006
545 0309 515	RES 392K OHM 1% 1/4W 1206	2	EA	R008,R015
620 2944 000	RECEPTACLE, SMA FLANGE MOUNT	2	EA	J001,J002
843 5466 681	SCHEM, UHF AMP, EXC SWITCHER	0		
843 5466 683	PWB, UHF AMP, EXC SWITCHER	1		
939 8203 021	HEAT SINK, EXC/SW AMP	1	EA	
302 0012 000	SCR, 2-56 X 1/4	4	EA	2/J001 2/J002
314 0002 000	WASHER SPLIT 3	4	EA	2/J001 2/J002



The following exciter switcher drawings are included with this technical manual:

839 8203 012 BLOCK DIAGRAM, EXCITER SWITCHING SYSTEM, SIGMA - INT DIPLEXED  
839 8203 013 WIRING DIAGRAM, UHF EXCITER SWITCHER, SIGMA EXC - INT DIPLEXED  
839 8203 001 SCH, EXCITER SWR (MAIN BOARD)  
839 8203 002 COMP LOCATOR, EXCITER SWITCHER  
843 5466 681 SCH, EXCITER SWITCHER AMP

