

**TECHNICAL MANUAL
EXCITER SWITCHER DTV
992 9843 005
988-2426-001**

HARRIS

T.M. No. 888-2426-001

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1.1 Introduction

This technical manual describes the Harris 992 9843 005 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 with the CD 1™ digital television 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 fault signals from both exciters. Front panel indicator lights on the switcher signal 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.

A 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 005

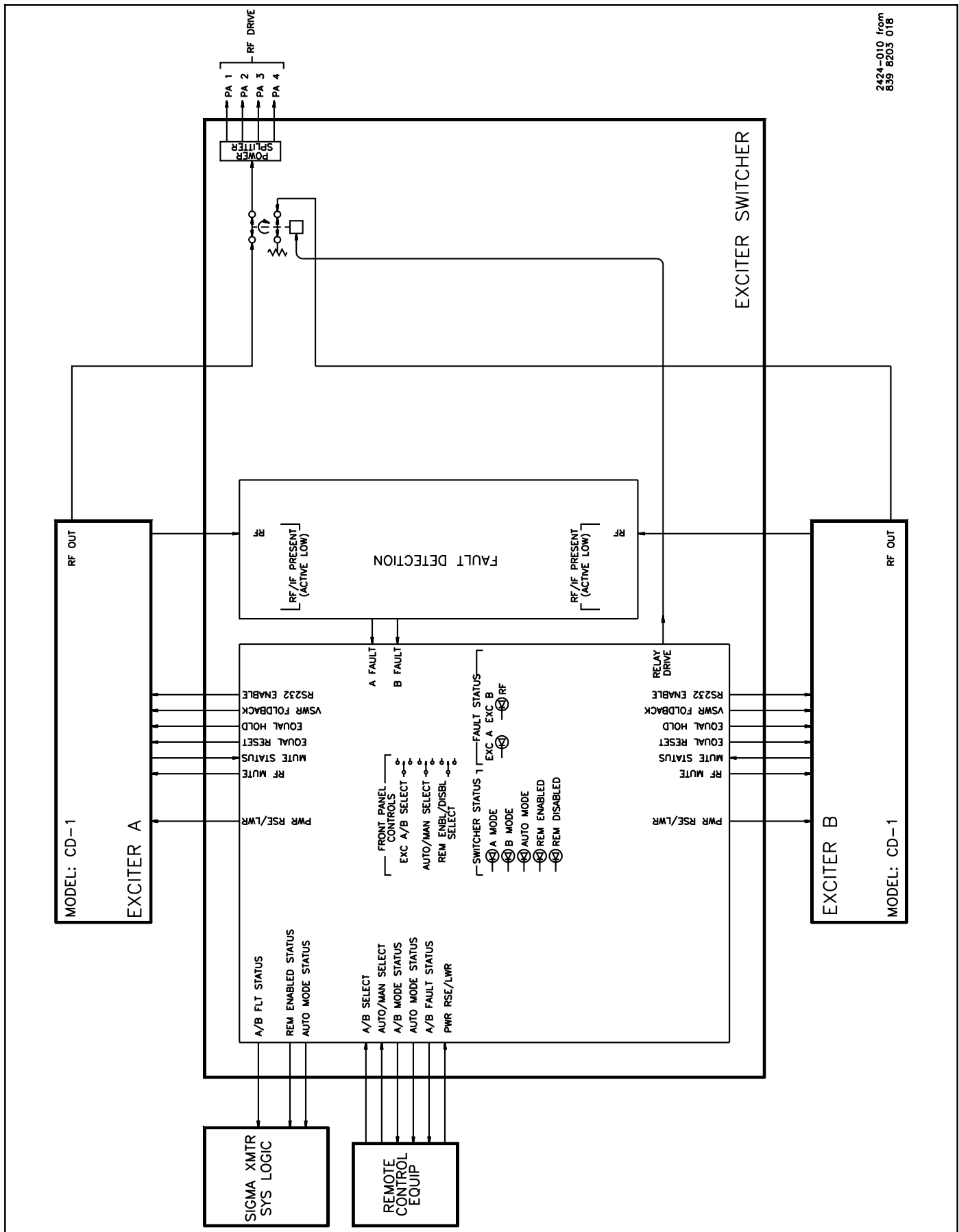


Figure 1-1. Block Diagram, Exciter Switcher

Table 1-1

Frequency Range	470 MHz to 860 MHz
INPUTS	
Max Level	+30dbm peak
Impedance	50 Ohms
Return Loss	-20dB or better
AUTO SWITCH FAULTS:	
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
Faults (Externally Sensed except where noted)	Exciter Fault (RF Power or digital)
REMOTE CONTROL:	
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.
POWER REQUIREMENTS:	
Regulation	All voltages: Less than 1%
Hum & noise	All voltages: -50dB or better
Power	+12VDC@500mA
CONNECTORS:	
RF Inputs and Outputs:	BNC Female
Exciter Interface (J2/J3):	DB25F
Transmitter Logic Interface (X5):	DB9F
Remote Control (J1):	DB25M
Power (J9):	9 Pin Male (Mates to AMP 1-640520-0)
PHYSICAL:	
Front Panel	
Width:	19"
Height:	3.47"
CHASSIS	
Width:	16.75"
Height:	3.2"
Depth:	15.75"
Overall Depth:	17.25"

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.

2.2 Remote Control

Remote control connections to the exciter switcher are connected to J1, a DB25 male connector. The connections are listed on drawing 839 8203 019, Wiring Diagram. The remote connections consist of command signals (causing an action in the switcher)

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.

2.3 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

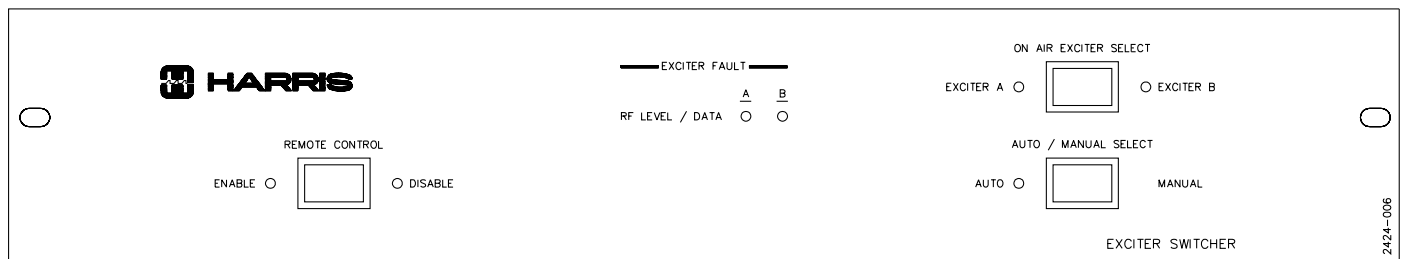
The EXCITER FAULT indicators at the center of the panel light to signal faults which can cause the switcher to change to the alternate exciter when in AUTO mode.

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 exciter faults to the operator.

3.3.1 RF LEVEL / DATA

These exciter faults originate in the exciters. A fault indicates either a failed RF level or a digital circuit fault.



*Figure 3-1
Front View of Exciter Switcher*

4.1 General Description

The Sigma CD™ transmitter exciter switcher is included in the control cabinet when two Sigma CD™ exciters are installed. The switcher selects one of the exciters to supply signals to the transmitter and connects appropriate dummy loads 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 if the on-air exciter fails.

The exciter switcher is constructed in a 17.25" deep chassis 2 rack units (3.47") high and 19" wide to be rackmounted in the transmitter control cabinet. Inside is a coaxial transfer relay and an RF output power splitter, 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 018, Block Diagram, Exciter Switching system.

Output from each exciter is connected to the coaxial transfer relay which selects one exciter's signal and terminates the reserve exciter's signal.

The selected signal from the relay is fed to power splitter SP-1 which divides the output into the number of feeds needed to drive all the PA amplifiers.

Fault outputs from the exciters are fed to the fault detection logic. These signals are 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 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 019, Wiring Diagram, UHF Exciter Switcher, CD-1 EXC, SIGMA DTV XMTR.

Inputs from both exciters at J20 & J21 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.

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

Fault status connections from the exciters are input at J2 and J3, and status and control interconnections with the transmitter are connected at X5. The connections are routed to the Main PWB. 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 J10 and J10A.

4.3 Exciter Switcher Main PWB

Refer to 839 8203 001, Schematic, Exciter Switcher.

The Main PWB is a multi-purpose board used in several different configurations of the exciter switcher. Several circuits included on the board are not used in this model of the 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

J2-4 is the fault input from exciter A, and J3-4 is the fault input from exciter B. The fault circuits for both exciters are the same. Only exciter A's fault circuits will be described.

The exciter fault signal is passed through opto-coupler U22 to JP15. JP15 may be set to the 1—2 position to route the fault signal to Summary Fault Logic Gate U13. Other externally-generated exciter status signals may be input, but when the CD 1™ exciter is used all exciter faults are sent to the exciter switch by way of J2-4 and J3-4, and the other faults are forced to a permanent Low (JP6-10, JP12-14).

Summary fault logic gates U13 (VIS A) and U14 (VIS B) receive the exciter faults selected by the jumpers noted above. Fault status are output from the board on J8.

VIS faults become exciter fault status in 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 enables or disables the remote commands.

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 disable 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 routes the control leads to the coaxial transfer relay in the switcher chassis.

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

Gates U3 route the MODE signals; when common amplification or the CD 1TM exciter is used, JP3 is set to force the unused Sound inputs to the gates to a High.

Sheet 4

JP4 is used to select internal or external equalization reset to digital CD 1TM 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.

5.1 Introduction

The exciter switch is an accessory for the exciters used when a dual-exciter system is installed. The exciter switcher used with the CD-1 Exciter has no adjustments.

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 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 005

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
356 0208 000	CLAMP, FLAT CABLE 2"	1.0 EA	
358 1214 000	SCREWLOCK, FEMALE	6.0 EA	
358 2598 000	CABLE TIE MOUNT, 4-WAY	1.0 EA	
448 1101 000	HANDLE, ALUMINUM	2.0 EA	
583 0152 000	RELAY, COAX TRANSFER	1.0 EA	K001
598 0470 000	FRAME, SNAP-IN, BLACK	3.0 EA	#S001 #S002 #S003
620 2965 000	POWER SPLITTER, 4-WAY	1.0 EA	SPL-1
700 1404 000	TERMINATION, 50 OHM 0.25W BNC	3.0 EA	R003 R004 R005
700 1405 000	TERMINATION, 50 OHMS 2W	1.0 EA	R001
839 8203 018	BLOCK DIAG,EXC SWITCHER SYSTEM	0.0 EA	
839 8203 019	WIRING DIAG, EXCITER SWITCHER	0.0 EA	
917 2510 016	CABLE PKG, CD-1	1.0 EA	
939 8203 027	ANGLE, MINI CKT MTG.	1.0 EA	
939 8203 032	COVER, REAR, SYNC-LO-SOUND	1.0 EA	
939 8203 034	CHASSIS, EXC/SW, CA1/CD1 EXC	1.0 EA	
939 8203 035	COVER, EXC/SW, (CA1/CD1 EXC)	1.0 EA	
939 8203 036	PANEL, FRT, EXC/SW (CD1)	1.0 EA	
992 9843 006	PWA, EXCITER SWITCHER, DTV	1.0 EA	
999 2900 001	HARDWARE LIST,EXCITER SWITCHER	1.0 EA	

Table 6-2. PWA, EXCITER SWITCHER, DTV - 992 9843 006

<i>HARRIS P/N</i>	<i>DESCRIPTION</i>	<i>QTY/UM</i>	<i>REF. SYMBOLS/EXPLANATIONS</i>
296 0310 000	TUBING TEFLON 20 AWG	0.730 FT	
358 1928 000	JUMPER 1/4 LG 1/8H	4.0 EA	JP019 JP020 JP021 JP022
380 0773 000	XSTR FET BS170 N-CHL ESD	7.0 EA	Q001 Q002 Q003 Q004 Q005 Q006 Q007
382 0288 000	IC, 4011/14011 ESD	1.0 EA	U006
382 0302 000	IC, 4023/14023 ESD	2.0 EA	U002 U005
382 0367 000	IC, 4049/14049 ESD	1.0 EA	U009
382 0414 000	IC, CD4002/MC14002 ESD	2.0 EA	U013 U014
382 0594 000	IC TL074ACN ESD	1.0 EA	U011
382 0618 000	IC, 4081/14081 ESD	2.0 EA	U003 U010
382 0719 000	IC LM324AN ESD	1.0 EA	U020
382 1070 000	IC, ILQ-1 OPTO-ISOLATOR ESD	4.0 EA	U007 U022 U023 U024
382 1192 000	IC, MC14584BCP ESD	2.0 EA	U004 U018
382 1210 000	IC CD4538B ESD	1.0 EA	U012
382 1629 000	IC ULN2804 ESD	5.0 EA	U001 U008 U017 U019 U021
383 0302 000	IC, LT1206CR ESD	2.0 EA	U015 U016
384 0205 000	DIODE SILICON 1N914/4148 ESD	45.0 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	18.0 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	1.0 EA	CR058
384 0837 000	TRANSZORB 1N6376 12V 5W ESD	2.0 EA	CR065 CR066
384 0903 000	LED, RED, T-1 ESD	3.0 EA	DS010 DS016 DS027
384 0904 000	LED, GRN, T-1 ESD	7.0 EA	DS001 DS004 DS006 DS009 DS024 DS025 DS026
384 0961 000	LED, YELLOW ESD	7.0 EA	DS002 DS003 DS005 DS007 DS008 DS022 DS023
404 0507 000	SOCKET IC 18 PIN	5.0 EA	XU001 XU008 XU017 XU019 XU021
404 0674 000	SOCKET 14 PIN DIP (D-L)	11.0 EA	XU002 XU003 XU004 XU005 XU006 XU010 XU011 XU013 XU014 XU018 XU020
404 0675 000	SOCKET IC 16 CONT	6.0 EA	XU007 XU009 XU012 XU022 XU023 XU024
404 0824 000	SOCKET, DIP14, LO PROFILE	8.0 EA	XK007A XK007B XK008A XK008B XK009A XK009B XK010A XK010B
404 0825 000	SOCKET, DIP16, LO PROFILE	4.0 EA	XK003 XK004 XK005 XK006
516 0453 000	CAP .1UF 100V 20% X7R	13.0 EA	C006 C008 C009 C011 C012 C013 C014 C017 C018 C019 C020 C028 C032
516 0530 000	CAP .01UF 10% 100V X7R	16.0 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	2.0 EA	C037 C038
522 0548 000	CAP 10UF 50V 20%	1.0 EA	C035
522 0550 000	CAP 100UF 25V 20%	5.0 EA	C005 C007 C010 C036 C039
522 0570 000	CAP 2.2UF 50V 20%	2.0 EA	C015 C022
540 1372 000	RES NETWORK 680 OHM 2%	3.0 EA	R047 R048 R049
540 1416 000	RES NETWORK 10K OHM 2%	6.0 EA	R021 R023 R064 R066 R068 R072
540 1430 000	RES NETWORK, 10K OHM 2%	3.0 EA	R012 R017 R092
540 1437 000	RES NETWORK 2000 OHM 2%	3.0 EA	R028 R065 R071
545 0293 000	*RES 51.1OHM 1/4W 1% 1206	2.0 EA	R001 R002
548 2051 000	RES ZERO OHM	2.0 EA	R039 R052
548 2400 156	RES 37.4 OHM 1/2W 1%	2.0 EA	R032 R033
548 2400 185	RES 75 OHM 1/2W 1%	6.0 EA	R029 R030 R031 R036 R046 R054
548 2400 269	RES 511 OHM 1/2W 1%	1.0 EA	R087
548 2400 285	RES 750 OHM 1/2W 1%	4.0 EA	R037 R038 R050 R051
548 2400 301	RES 1K OHM 1/2W 1%	15.0 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%	5.0 EA	R076 R077 R078 R079 R080
548 2400 342	RES 2.67K OHM 1/2W 1%	1.0 EA	R067
548 2400 368	RES 4.99K OHM 1/2W 1%	8.0 EA	R013 R014 R015 R016 R026 R027 R040 R043
548 2400 380	RES 6.65K OHM 1/2W 1%	2.0 EA	R018 R020
548 2400 401	RES 10K OHM 1/2W 1%	19.0 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%	4.0 EA	R055 R058 R061 R063
550 0913 000	POT, 5K OHM	4.0 EA	R069 R070 R073 R074
574 0477 000	RELAY 4 PDT 12VDC 2 AMP	4.0 EA	K007 K008 K009 K010
574 0485 000	RELAY DPDT 12VDC 2 AMP	3.0 EA	K003 K004 K005
578 0026 000	RELAY DPDT 12VDC 2 AMP	1.0 EA	K006
578 0029 000	RELAY 12V SPCO RF SW PCB	2.0 EA	K001 K002

604 1147 000	SW PB SPST-N.O. MOM	1.0 EA	S004
604 1205 000	SW, SPDT MOMENTARY	3.0 EA	S001 S002 S003
610 0827 000	HEADER, 20 PIN PC RIBBON	1.0 EA	J004
610 0828 000	HEADER, 26 PIN PC RIBBON	4.0 EA	J001 J002 J003 J008
610 0830 000	HEADER, 10 PIN PC RIBBON	1.0 EA	J007
610 0855 000	HEADER 34 PIN PC RIBBON	2.0 EA	J010 J010A
610 0900 000	HEADER 3 CKT STRAIGHT	18.0 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	10.0 EA	TP001 TP002 TP003 TP004 TP005 TP006 TP007 TP008 TP009 TP010
610 0950 000	PIN HEADER 6 PIN	1.0 EA	J009
610 1304 000	HEADER, 16 PIN PC RIBBON	2.0 EA	J005 J006
612 1184 000	JUMPER .1" CENTERS	18.0 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	9.0 EA	J030 J031 J032 J033 J034 J035 J038 J039 J040
839 8203 001	SCH, EXCITER SWITCHER PWB	0.0 EA	
839 8203 002	LAYOUT, COMPONENT,	0.0 EA	
839 8203 003	PWB, EXCITER SWITCHER	1.0 EA	

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

839 8203 018 BLOCK DIAGRAM, EXCITER SWITCHING SYSTEM, CD-1 EXC, SIGMA DTV XMTR
839 8203 019 WIRING DIAGRAM, UHF EXCITER SWITCHER, CD-1 EXC, SIGMA DTV XMTR
839 8203 001 SCH, EXCITER SWR (MAIN BOARD)
839 8203 002 COMP LOCATOR, EXCITER SWITCHER