a multitone group company

Paging Systems Limited

The **PSL 693**

931MHz Exciter

Technical Handbook

ISSUE 1.0

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Preface

The PSL 693 Exciter Technical Handbook is a technical and reference guide to the 931MHz Exciter developed by Paging Systems Limited, and is structured as follows:

Chapter 1 provides an introduction to the Exciter, lists its principal features and details its technical specification.

Chapter 2 describes the required installation, connection and set-up procedures.

Chapter 3 provides operating and maintenance instructions.

Chapter 4 provides fault finding instructions for On-Site Checks.

Figure 4.1 Exciter System Block Diagram.

Figure 4.2 Exciter Board Layout Block Diagram

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Chapter 1. Introduction and technical specification

1.1. Introduction

The PSL 693 Exciter unit, designed and developed by Paging Systems Limited, is mechanically and electrically compatible with the 1200/2400 baud 931MHz Quintron transmitter.

The unit is software configurable to meet future higher speed data modulation requirements and can be used in place of the Quintron exciter unit.

The exciter interfaces to a transmitter control unit which provides data up to 4800 baud for 2 level FSK, 6250 bps for 4 level FSK (ERMES),and audio both flat and pre-emphasised. The transmitter uses the data to modulate an RF carrier between precise frequency states. The modulation format may be switched between batches.

The output is a nominal 931MHz signal which is used to drive the power amplifier.

1.2. Main features of the exciter module

The main functional features of the Exciter board are:

- interface with the Quintron Transmitter
- synthesise any 1 of 16 highly stable output frequencies in the 924-960MHz band
- 8 remotely addressable modulation modes
- modulate the output frequency with digital modulation
  eg. 2 level FSK NRZ DC to 4800 baud maximum
  4 level FSK at 6250 bps (ERMES)
- flat and pre-emphasised audio modulation capability
- user adjustable carrier and deviation offset
- optimum adjacent channel performance and low spurious signals

Additional features available with a software upgrade

- 2 level FSK at 9600 baud
- 8 level FSK

1.3. Technical specification

This section details the technical specification for the exciter module.

Dimensions

Envelope (W x D x H)	490mm x 375mm x 88mm max.
Size	19" rack mount. 2U high.
Installation envelope	490mm x 975mm x 88mm (front access only)
Weight	10Kg max.

Connections

Input signals:	Multiway Connector containing:-	
	Audio input	2 Lines
	Data input	3 Lines, 1 shared with MSB of channel select
	Clock input (4 level FSK)	1 line, shared with reference frequency output
	External frequency reference	BNC
Output signal:	RF Output Port	BNC
	Reference frequency	BNC
Control Lines	Multiway Connector containing:	
	Key In	1 line
	Mode Select	1 line
	Channel Select	4 lines
	Modulation Select	3 lines
Status Lines	Multiway Connector containing:	
	Key Out	1 line
	Fault Out	1 line
	Analogue Mod Ind	1 line
	FSK Mod Ind	1 line
DC Supplies		Insulated choc block
Earth		Earth stud

Performance

Frequency Range	924-960 MHz
Power Output	20 dBm min - 23 dBm max
Duty Cycle	Continuous
No. of Channels	16 for 2 and 4 level FSK
Switching Bandwidth	3 MHz
Channel Spacing	Fully software programmable eg. 12.5 KHz, 20 KHz, 25 KHz, 30 KHz

Carrier Offsets		-800Hz < fc < +700Hz in 100 Hz steps
Frequency Stability: (Internal Option) (Provision is made for external 10MHz input)	Short Term Ageing	± 1 in 10^8 1 in 10^7 per year
Modulation: Digital	Mode 0, 2-7	2 level FSK NRZ DC to 4800 baud; 67, 125 or 250µS rise time (selectable.) Deviation selectable from +/-3.5 KHz to +/-5.0KHz in 100Hz steps.
	Mode 1	4 level FSK NRZ preset to ERMES specifications
Modulation: Analogue	Flat	+/- 1 dB at 3KHz deviation over range 20 - 3000Hz.
	Pre-emphasised	+/- 1 dB from 6 dB per octave pre-emphasised curve, 300 - 3000 Hz
Audio Distortion:		<1.5% over audio passband.
Spurious Emissions:	Non Harmonic Harmonic	<-70 dBc <-20 dBc
Adjacent channel Power:		FCC Spectrum Mask: Compliant, with 67µS risetime, at 4800 baud , and +/- 4.5KHz deviation.
FM Hum and Noise:		40 dB minimum below a 1 KHz signal with 3.0 KHz deviation measured in a 0-15 KHz bandwidth.
Keying Time		10mS max.
Mode Change (No Unkey)		10mS max.
Channel Change Time		200mS max.
Emission Designators		16K0F1D, 16K0F3E
Warmup Time		15 mins max. (if internal frequency standard is fitted.

Interface characteristics

Input Port	Digital Inputs: Modulation select	TTL
	Others	TTL or RS-232/CCITT V28 levels, polarity selectable.
	Analogue Input:	-25 to +15 dBm, 600 ohm unbalanced. 44mV to 4.4 volts 5k ohm unbalanced.

	Ext Reference Input (optional):	
	Frequency:	10MHz.
	Impedance:	50 Ohms
	Level:	10 dBm +/-1 dBm
	SSB Phase noise at 25KHz offset:	-140 dBc/Hz max.
Output Ports	RF Output Impedance:	50 ohm nominal
	RF Output protection:	Any load, any phase
	Status Lines:	Ground (33ohm) or Open Circuit
Tray	Finish:	Conducting and corrosion resistant.
	Polarity:	Earth
	Fixings:	At earth polarity
Thermal	Cooling method:	Convection

Input power supply

Power Input	DC	24V nominal @ 2.8A max. 18 to 29V DC operating range.

Environmental

Transport:	The unit is capable of being transported by road, sea or in an unpressurised aircraft with no adverse effect on subsequent operation.	
Storage:	The unit is capable of being stored for 1 week at:	
	Min temperature:	-35° C
	Max temperature:	+75° C
	Humidity:	0% to 95% (non-condensing)
Operating Specification:	The unit operates to the full specification over the following ranges:	
	Min Temperature:	-30° C
	Max Temperature:	+70° C
	Humidity:	0 - 95% (non-condensing).
Elevation:	To 10,000 feet ASL.	

Safety

The unit contains no hazardous or toxic substances accessible under normal use.

Bit/Byte

Status Signals:	Key Out	
	Fault Out	
	Analogue Mod Present	
	FSK Mod Present	
LED Indicators:	Power	(green)
	Fault	(red)
	Mod	(green)
	Key/Local	(green / red / orange)
	Analogue/Digital	(green / orange)

Reliability and maintainability

Design life: The exciter has a design life in excess of 10 years and components have been chosen with proven reliability and which will be available for the foreseeable future.

MTBF: The MTBF of the unit should exceed 50,000 hrs (TBC) for continuous operation in a ground environment calculated in accordance with MIL-Hdbk-217E.

Maintenance: No maintenance will be carried out by PSL. However, Fault-finding instructions are provided in this Manual to enable customer service engineers to diagnose failures down to PCB level to enable swapping with a spare PCB. Any failed units should be returned to an approved service centre for repair.

Chapter 2. Installation

2.1. Unpacking

Carefully unpack the equipment and check it for any signs of damage. Cross-check the items received against the packing list. Any damage or shortage should be reported immediately, both to the Carriers and to Paging Systems Limited.

Transit clamp

The U.H.F. V.C.O assembly is mounted on springs. During transit the assembly is clamped in position using a transit clamp located at the front-centre of the base tray. Before using the unit, the transit clamp should be unlocked by turning it through 90° in an anti-clockwise direction. Check that the module is then free to move on its springs.

Always ensure that the clamp is replaced before the unit is transported.

WARNING: Failure to replace the clamp before transportation may result in damage to the unit.

2.2. Installation of exciter

The exciter is designed for mounting in a standard 19 inch cabinet or equipment rack. Sliding mounts are supplied which are designed to bolt into the cabinet or rack to provide ease of installation and servicing.

The exciter should be mounted so that there is free air-flow both through the holes in the covers and around the heatsink.

2.3. Connections to exciter

All connections are made at the rear of the chassis.

2.3.1. Transmitter connector J3

50 ohm female BNC type connector.

- Connect to transmitter, ensuring that the connector is fully tightened.

2.3.2. DC supply TB1

- Connect to 24v 3A supply using 30/0.25mm PVC covered cable. The connections are as follows:

  Pin 1 - +24V
  Pin 2 - OV (ground)

2.3.3. Controller connector J1

J1 connector is a 37 way 'D' type plug.

The pinout connections to the facilities connector are as follows:-

Pin No.	Function	Comments
Pin 1	Voice input	Unbalanced audio; pin 2 is audio ground.
Pin 2	Voice input	
Pin 3	Flat input	Unbalanced audio; pin 4 is audio ground
Pin 4	Flat input	
Pin 5	Not used	
Pin 6	Key input	RS232/TTL, invert facility.
Pin 7	Keyout	Open circuit or 33 ohm resistor to ground.
Pin 8	FSK / Audio mode select	RS232/TTL, invert facility.
Pin 9	Data input 1 (LSB)	RS232/TTL, invert facility.
Pin 10	Channel select - A (LSB)	RS232/TTL, invert facility.
Pin 11	Channel select - B	RS232/TTL, invert facility.
Pin 12	Fault Output	Open circuit or 33ohm resistor to ground.
Pin 13	Analog mod indication	
Pin 14	FSK mod indication	
Pin 15	Not used	
Pin 16	Ground	
Pin 17	Ground	
Pin 18 *	Channel select - C	RS232/TTL, invert facility.
Pin 19 *	Channel select - D (MSB) or Data input 3 (MSB)	RS232/TTL, invert facility.
Pin 20 *	Data Clock, 4 and 8 level FSK	RS232/TTL, invert facility.
Pin 21	Not used	
Pin 22	Not used	

[Continued....]

Pin No.	Function	Comments
Pin 23	Not used	
Pin 24	Not used	
Pin 25	Not used	
Pin 26	Not used	
Pin 27	Not used	
Pin 28	Not used	
Pin 29	Not used	
Pin 30	Not used	
Pin 31	Not used	
Pin 32	Not used	
Pin 33	Not used	
Pin 34 *	Mod. Mode Select - A (LSB)	TTL, positive logic
Pin 35 *	Mod. Mode Select - B	TTL, positive logic
Pin 36 *	Mod. Mode Select - C (MSB)	TTL, positive logic
Pin 37 *	Data Input 2	TTL, positive logic

NOTES: All unused pins are free of connections.

* = Additional to existing Quintron connections.

For 2 level FSK, use data input 1 (Pin 9).
For 4 level FSK, use Data Clock input (Pin 20).
For 4 level FSK, use data inputs 1 and 2 (Pins 9 and 37).

Audio input can be either flat or voice, but not both simultaneously.

2.3.4. 10 MHz Input/Output connector J2

50 ohm female BNC type connector:

- Connect to external 10MHz reference if used. If not, the connector provides a sample of the internal 10MHz reference.

Chapter 3. Operation and maintenance

3.1. Front panel indicators

3.1.1. Status indicators

The following five LEDs on the front panel indicate the current status of the transmitter (reading from left to right):

DC Supply

This green LED indicates that a DC power supply is present.

Fault alarm

This red LED illuminates when a fault condition exists. It is a composite alarm covering RF PLL lock detect, UHF PLL lock detect, crystal over temperature and DSP failure.

Modulation indication

This green LED indicates the presence of external modulation in both analogue and digital modes.

Local/Remote key

This is a three colour LED:
LED off signifies Remote mode unkeyed.
A green LED signifies Remote mode keyed.
A red LED signifies local mode unkeyed.
An orange LED signifies local mode keyed.

Analogue / Digital Indication

This is a permanently lit two colour LED; either green for analogue, or orange for digital modes.

3.2. Control from the controller connector J1

The 37 way 'D' connector on the rear of the exciter provides the main interface and the following paragraphs describe the functions available. A full pin map for this connector is given at the end of Chapter 2.

The exciter factory default settings are configured as shown below.

3.2.1. TTL/RS232 inputs

All TTL/RS232 inputs have internal pull-up resistors to 5V. All TTL/RS232 inputs can be inverted by insertion or removal of links on the DDS printed circuit board. In this section a high input is an input voltage between +3.5 and +15v, and a low input is an input between 0.8v and -15v.

1. Data input

Pins 9, 20, 19,	Input Condition	Frequency Shift
	Low	Negative transition
	High	Positive transition

The data sense can be inverted by SW1/5 on the DDS board (2 level FSK only). For 4 and 8 level FSK, a clock plus 2 or 3 bits of parallel TTL positive logic is required.

2. Transmitter key input

Pin 6	Input Condition	RF output
	Low	Keyed on
	High	Keyed off

The key function can be inverted by moving link LK2 on the DDS board.

3. FSK / Audio mode select

Pin 8	Input Condition	Function
	Low	FSK
	High	Audio

This function can be inverted by moving link LK1 on the DDS Board.

4. Channel select inputs — Channel Selected

Pins 10, 11, 18, 19:

D (MSB)	C	B	A (LSB)		
low	low	low	low	CH0	}
low	low	low	high	CH1	}
low	low	high	low	CH2	}
low	low	high	high	CH3	}
low	high	low	low	CH4	} 2, 4 and 8
low	high	low	high	CH5	} level FSK
low	high	high	low	CH6	}
low	high	high	high	CH7	}
high	low	low	low	CH8	}
high	low	low	high	CH9	}
high	low	high	low	CH10	}
high	low	high	high	CH11	} 2 and 4
high	high	low	low	CH12	} level FSK
high	high	low	high	CH13	} only
high	high	high	low	CH14	}
high	high	high	high	CH15	}

NOTE: low = 0, high = 1

This function can be reconfigured, as described in section 3.3, 'Internal switch settings and links'.

3.2.2. TTL inputs and outputs

Pins 34, 35, 36

TTL inputs and outputs are positive logic and **cannot** be inverted by insertion or removal of links. In this section, a '0' is a TTL low (0-0.4 volts) and a '1' is a TTL high (2.4-5.0v). All TTL inputs have internal pull up resistors. All TTL outputs are from open collectors with internal 4k7 pull-up resistors to +5v.

1. Modulation Mode Select

Modulation select inputs

C (MSB)	B	A (LSB)	Mode
low	low	low	0
low	low	high	1
low	high	low	2
low	high	high	3
high	low	low	4
high	low	high	5
high	high	low	6
high	high	high	7

3.2.3. Audio input

Pins 1, 2, 3, 4

Unbalanced audio -25dBm to +15dBm into 600 ohms or 44mV to 4.4 V into 5000 ohms selectable.

3.2.4. Alarms and supervisory outputs

A low state is represented by a 33 ohm resistor to ground, and a high state by an open circuit.

1. Fault output

Condition	Pin 12
No fault	low
Fault	high

2. Keyout

Condition	Pin 7
key	low
No key	high

3. FSK Mod Indication

Condition	Pin 14
Modulation present	low
No modulation present	high

4. Analogue Modulation Present

Condition	Pin 13
Modulation present	low
No modulation present	high

3.3. Internal switch settings and links

3.3.1. DDS Board

Switch Bank 1

SW1/1 - Not in use
SW1/2 - Not in use
SW1/3 - Closed = Select Centre Frequency
Open = Normal (Factory Setting)
SW1/5 - Closed = FSK Invert
Open = Normal (Factory Setting)
SW1/6 - Closed = Local Operation
Open = Remote Operation (Factory Setting)
SW1/8 - Closed = Flat Audio Response (Factory Setting)
Open = Pre-emphasised Audio Response

NOTE: When switching between flat and pre-emphasised Audio Response, the unit should be powered down, the selection made, and the power then re-applied.

Rise time selection:

125µS	SW1/7 = Closed	SW1/4 = Open (Factory Setting)
250µS	SW1/7 = Open	SW1/4 = Open
67µS	SW1/7 = Either	SW1/4 = Closed

NOTE: SW1/4 (Closed) overrides the settings on SW1/7.

Switch Bank 2

SW2 allows the selection of FSK deviations from +/- 3.5KHz to +/- 5.0KHz in steps of 100Hz.

SW2/1	SW2/2	SW2/3	SW2/4	Deviation (Hz)	
CLOSED	CLOSED	CLOSED	CLOSED	3500	
CLOSED	CLOSED	CLOSED	OPEN	3600	
CLOSED	CLOSED	OPEN	CLOSED	3700	
CLOSED	CLOSED	OPEN	OPEN	3800	
CLOSED	OPEN	CLOSED	CLOSED	3900	
CLOSED	OPEN	CLOSED	OPEN	4000	
CLOSED	OPEN	OPEN	CLOSED	4100	
CLOSED	OPEN	OPEN	OPEN	4200	
OPEN	CLOSED	CLOSED	CLOSED	4300	
OPEN	CLOSED	CLOSED	OPEN	4400	
OPEN	CLOSED	OPEN	CLOSED	4500	(Nominal - Factory Setting)
OPEN	CLOSED	OPEN	OPEN	4600	
OPEN	OPEN	CLOSED	CLOSED	4700	
OPEN	OPEN	CLOSED	OPEN	4800	
OPEN	OPEN	OPEN	CLOSED	4900	
OPEN	OPEN	OPEN	OPEN	5000	

Switch Bank 3

SW3 allows the selection of Centre Frequency Offsets from Nominal in the range Nominal -800Hz to Nominal+700Hz in steps of 100Hz.

Fc Offset (Hz)

SW3/1	SW3/2	SW3/3	SW3/4	Fc Offset (Hz)	
CLOSED	CLOSED	CLOSED	CLOSED	-800	
CLOSED	CLOSED	CLOSED	OPEN	-700	
CLOSED	CLOSED	OPEN	CLOSED	-600	
CLOSED	CLOSED	OPEN	OPEN	-500	
CLOSED	OPEN	CLOSED	CLOSED	-400	
CLOSED	OPEN	CLOSED	OPEN	-300	
CLOSED	OPEN	OPEN	CLOSED	-200	
CLOSED	OPEN	OPEN	OPEN	-100	
OPEN	CLOSED	CLOSED	CLOSED	0	(Nominal - Factory Setting)
OPEN	CLOSED	OPEN	OPEN	+100	
OPEN	OPEN	CLOSED	CLOSED	+200	
OPEN	CLOSED	CLOSED	OPEN	+300	
OPER	OPEN	CLOSED	OPEN	+400	
OPEN	CLOSED	OPEN	CLOSED	+500	
OPEN	OPEN	OPEN	CLOSED	+600	
OPEN	OPEN	OPEN	OPEN	+700	

Link settings

In this section, Low voltage = +0.4v to -15v
High voltage = +3v to +15v

LK1: selects the polarity of the Mode Select input (J1 pin 8).

Link position	FSK	Audio
1/2	High	Low (factory setting)
2/3	Low	High

LK2: selects the polarity of the key input (J1 pin 6).

Link position	KEY ON	KEY OFF
1/2	Low	High (factory setting)
2/3	High	Low

LK8: selects the EPROM type

Link position	EPROM
1/2	27C256
2/3	27C512 (factory setting)

Channel Select Inputs may be set to either positive or negative logic.

For **positive logic** sense of 4 channel select lines, set the following link positions:-

LK3	Position 1/2	)
LK4	Position 2/3	) Factory
LK5	Position 1/2	) Setting
LK6	Position 1/2	)

For **negative logic** sense of 4 channel select lines, set the following link positions:-

LK3	Position 1/2
LK4	Position 2/3
LK5	Position 2/3
LK6	Position 2/3

Local Key SW5

SW5 is the local key switch. This is only operational when Local Mode (SW1/6) is selected. The external key input is disabled and SW5 becomes the key line.

Key on = SW5 pushed down;
Key off = SW5 pulled up (Factory Setting).

3.3.2. UHF PLL board

The unit is supplied with the links tracked to nominal factory settings. For any other settings, these links must be cut and set as shown below.

Phase detector external reference divider selection

Links 7, 8, 9, 10, and 11 allow the internal / external 10MHz reference to be divided by the following ratios for clocking the synthesiser oscillator input:

Division ratio	Link Position 1/2
divide by 1	LK7
2	LK8
4	LK9
5	LK10
10	LK11 (Nominal - Factory setting)

All other links are set to 2/3.

Phase detector internal reference divider selection

Links 12, 13, and 14 establish a code to the synthesiser defining one of eight possible divide values for the total reference divider (phase detector reference).

Reference address code				
LK14	LK13	LK12	Total divide value	
0	0	0	8	(Nominal - Factory setting)
0	0	1	64	
0	1	0	128	
0	1	1	256	
1	0	0	512	
1	0	1	1024	
1	1	0	1160	
1	1	1	2048	

Position 1/2 = 0
Position 2/3 = 1

N and A counter selection

The N and A counter selects the total divide value of the RF signal, and is given by:

$$N_{TOTAL} = \frac{\text{RF Frequency into the Prescaler}}{\text{RF Frequency into the Phase Detector}} = N \times P + A$$

Where: N is the number programmed into the divide by N counter
A is the number prorgrammed into the divide by A counter
P is the divide ratio of the prescaler

Links 15, 16, and 17 represent the three least significant bits of the N value expressed in binary (LK15 = the least significant bit).

Links 1 through to 6 represent the A value expressed in binary (LK6 = the least significant bit).

EXAMPLE:

RF Frequency - 457MHz
Phase detector reference - 125kHz
Prescaler divide ratio - 64

$$N_{TOTAL} = \frac{457MHz}{125kHz} = 3656$$

Therefore, N x P + A = 3656

Hence: N = 57 = 000111001
A = 8 = 001000

Therefore, the link settings are as follows:

N counter:

LK17	LK16	LK15
0	0	1

(Nominal factory setting)

A counter:

LK1	LK2	LK3	LK4	LK5	LK6
0	0	1	0	0	0

(Nominal Factory setting)

Position 1/2 = 0
Position 2/3 = 1

3.4. Reference oscillator

The exciter can be run from either an internal or an external 10MHz reference oscillator. The internal oscillator is an option, and would not normally be fitted.

3.5. Maintenance

There are no fixed maintenance routines for this equipment. A visual inspection can be carried out to ensure that all plugs and sockets are secure, and that the front panel LED status indicators are showing as follows, reading from left to right:

- the 'Power' LED is ON (green light)
- the 'Fault' LED is OFF
- the 'Mod' LED is normally OFF (green light if modulation present)
- the 'Key' LED is normally OFF ('ON' if keyed)
- the 'Analogue' LED is ON (green for audio mode, orange for digital mode).

Chapter 4. Fault finding

4.1. Introduction

The exciter is not specifically designed to be repaired on site. After basic checks are carried out, the unit should be replaced and the faulty unit returned to the workshop.

However, because of the modular construction, faulty modules may be identified and replaced on site if preferred.

4.2. On site checks

Locate the exciter tray in the transmitter rack. Reading from left to right, the LED indicators on the front panel of the exciter should be as follows:

- 'Power' LED is ON (Green)
- 'Fault' LED is OFF
- 'Mod' LED normally OFF (Green if modulation is present)
- 'Key' LED normally OFF (ON if keyed)
- 'Analog' LED ON - Green for Audio Mode, Orange for Digital Mode

Power supply failure

A situation in which none of the LED's are ON indicates a possible power supply failure. To check for a power supply failure, slide the exciter tray out of the transmitter rack and remove the lid. Perform the following checks:

- Check all the external connections to the rear of the exciter tray.
- Using a DVM, check that a nominal +24 volts (w.r.t. chassis) appears on turret lug P7 on the Power Supply Board.
- Check that the fuse FS1 on the Power Supply Board is not blown.

If the above conditions are correct but the exciter is not operational, a Power Supply Board failure is indicated and the exciter should be replaced by a new unit (see 5.2.1).

'Fault' LED ON

If the 'Fault' LED is ON (Red), perform the following checks:

- Check that the 'Lock' LED (Green) on the 931MHz RF assembly is ON.
- Check that the 'Lock' LED (Green) on the UHF assembly is ON.

- Check that LED1 (Green) on the DDS Board is ON.

  If all three of these LED's are OFF, check that the external 10MHz clock (J2 connector on the rear of the unit) is present and at the correct level of +10dBm ±1dB into 50 ohms.

  If the 10MHz clock is present, but one or more of the above stated LED's are OFF, the exciter should be replaced by a new unit (see 4.2.1).

  If the unit passes these checks, remove the RF output (J3) on the rear of the exciter from the input to the transmitter and check that this output is at a level of +20dBm nominally when the exciter is keyed.

Check the frequency

To check that the frequency is correct (931.4375MHz for Channel 1), the exciter must be set to output centre frequency by setting SW1/3 on the DDS Board to the 'closed' position.

To key the exciter locally, switch SW1/6 on the DDS Board to the 'closed' position ('local' setting), and push down the 'local key' switch SW5 (also located on the DDS board).

Check modulation

In order to check modulation, first ensure that SW1/3 on the DDS Board is switched back to the 'open' position (centre frequency NOT selected). Modulate the exciter and check that modulation is present on the RF output.

NOTE: *If any test fails, it is advisable to replace the exciter with a new unit, and return the suspect unit back to the workshop.*

4.2.1. Replacing the exciter unit

In order to replace the existing exciter unit with a new one, the following steps should be performed:

- Slide the exciter tray out of the transmitter rack, and remove the top lid.
- Disconnect all cables from the rear of the exciter tray.
- Push the spring mounted UHF assembly downwards, and tighten the transit clamp by turning it clockwise ensuring that it is fully engaged with the slot in the UHF VCO cover.
- Replace the lid securely and remove the exciter tray from the transmitter rack.
- Slide the new exciter into the transmitter rack, and remove the lid.
- Release the transit clamp of the spring mounted UHF assembly by turning it 90 degrees anti-clockwise. Check that the UHF module is free to move on it's springs.
- Re-connect all appropriate cables to the rear of the exciter tray.
- Normally, all switch and link settings have been factory set. If any adjustments are required, refer to section 3.3 of the handbook or compare to unit being replaced.
- Replace the lid, and perform the basic 'on site' checks (as in 4.2).

Figure 4-1: Exciter System Block Diagram

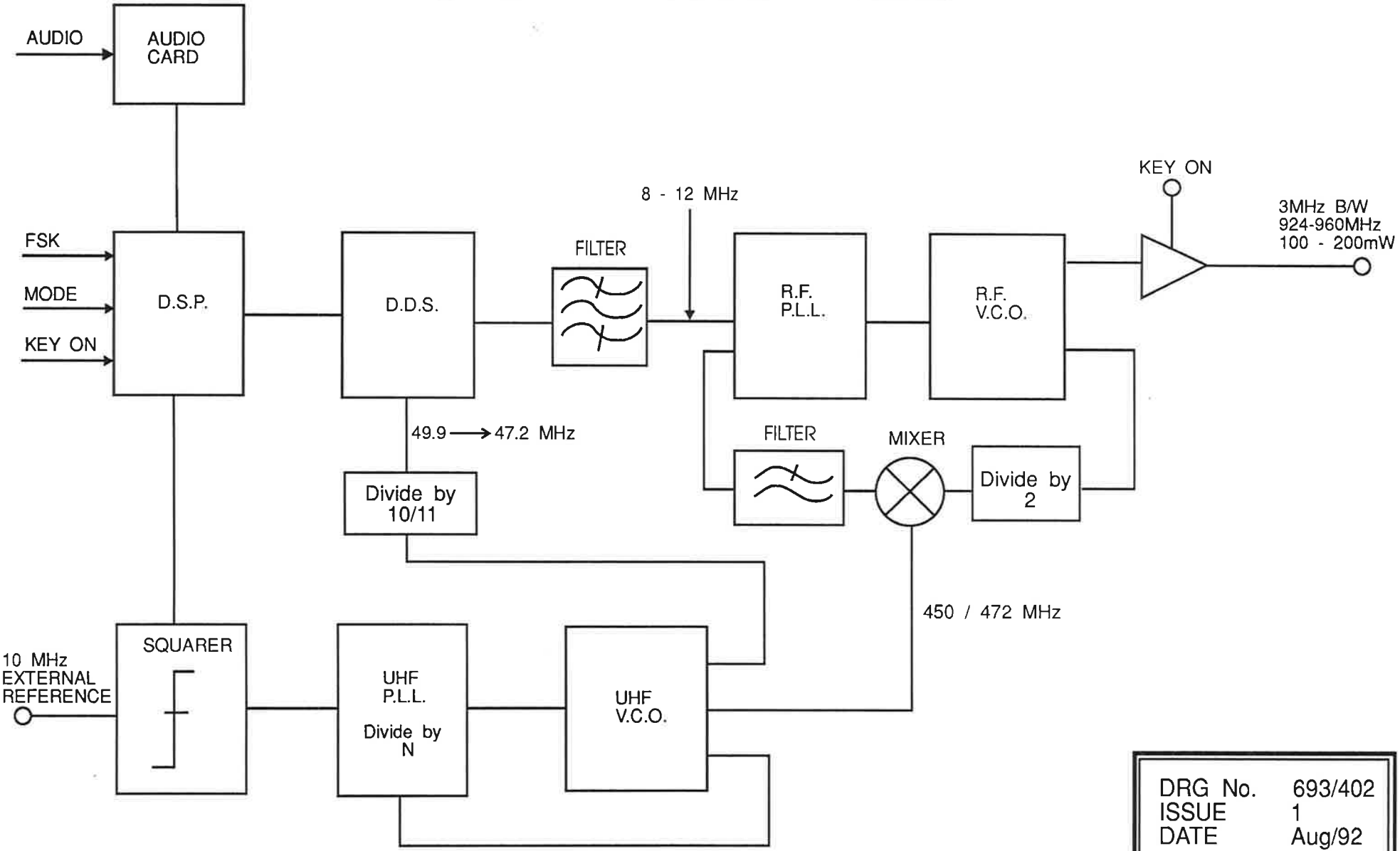

FIGURE 4-2: 931MHz EXCITER BOARD LAYOUT BLOCK DIAGRAM