MUSTANG
COMMUNICATIONS

MDS AMPLIFICATION RANGE

INSTALLATION & MAINTENANCE HANDBOOK

Issue No.2

SCOPE OF THIS ISSUE:

MDS.*M
MDS.*MA
MDS.*A

Input modules

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INDEX

page

APPENDICES

CE Electromagnetic compatibility (EMC) directive 89/336/EEC and amendment directive 92/31/EEC

This equipment has been designed and manufactured to the highest standards. If connected and operated as set out in this manual, there should be no Electromagnetic Compatibility problems. If any aspect of operation gives rise to concern, then please contact the manufacturer for advice.

INTRODUCTION

Thank you for purchasing this unit. We are confident that you have made a wise decision, and that you will have many years of trouble-free operation. Considerable care has been taken during the design and manufacturing processes to ensure your entire satisfaction and naturally, we would hope that the unit will perform to our design expectations, though this will be possible only if the installation is in line with professionally accepted standards and techniques.
This manual is intended, therefore, to ensure that both the installer and operator have all the necessary information to enable them to install, commission, and operate the unit in the most effective manner. We hope you will find the manual helpful, and easy to read.

The Company and its quality statement

Mustang Communications, is the manufacturing mark of equipment manufactured by Mustang Communications Limited, of Scarborough, England. The company is independent, wholly British, and dedicated to the manufacture and distribution of high-reliability, high performance public address and associated control equipment. Mustang Communications was first registered in 1966, in England.
The Company undertakes to manufacture equipment to the highest standards of workmanship and performance. Our Quality Assurance scheme operates to, or exceeds, the standards set out in British Standard BS.5750, or European standard ISO.9000. If you have cause to doubt at any time that the design, manufacture, or distribution does not comply, then you are invited to write to us with your comments, which will be most welcome.
Please address your correspondence to The Managing Director.

APPLICATIONS

The MDS range is primarily intended for hotel room music distribution systems, utilising several VHF tuners and CD/tape equipment, but by appropriate choice of input modules will perform with outstanding results in a multitude of applications, and a few only are listed under:-

hotel bedhead music systems
multi-channel factory background music
simultaneous translation systems
sound re-inforcement systems
background music, with selectable zoned paging
controlled noise systems
multi-channel audio visual systems
cine film sound-track systems
slave amplification - distribution systems
intercom systems

Immediate technical advice for specific problems is available from the Technical Services Department, Mustang Communications Ltd.

GENERAL DESCRIPTION

The Mustang MDS range of amplification consists of high quality general purpose 2, 4 and 6 channel 10 Watt amplifiers and pre-amplifiers. Input pre-amplification and radio programme tuning takes place on a series of plug-in circuit modules selected from the range indicated on page 6. By factory adaptation, the equipment may be wired to accommodate other modules for microphone amplification, tone generation, etc. This requirement must be specified at the time of order placement, along with the AM and/or VHF tuner modules required.
Pre-amplifier power supply regulation is also contained on a plug-in module. After pre-amplification, the resulting signals are directed to treble and bass filters before being channelled to the associated power amplifier section where fitted. At this stage the signal is finally amplified to 100 Volt line level with a power capacity of 10 Watts via the standard fitted transformer. The power requirements for the amplifier are taken from the normal AC mains supply at 240 Volts (or 120 Volts to special order) which is converted to the required DC voltages by a substantial internal power supply.

The controls accessible to the operator are confined to channel monitoring facilities, and the AC Mains ON-OFF switch. All other adjustments and settings are internal. Each unit in the range is also supplied with a detachable mains input connector. Input and output connections at the rear are clearly marked. All the units in the range are available either as rack mounting versions or free standing cased versions. The latter are fitted with plastic feet on the bottom and the cases are easily detachable for initial setting up and maintenance.

In use the amplifiers will give trouble free and accurate performance, and failure or partial failure is likely to be a result of external problems with loudspeaker or input cabling etc. The following pages will provide a guide to setting up, operation and maintenance of the amplifier, but in case of difficulty it would be advisable to consult a qualified dealer or the manufacturer.

WARRANTY

This amplifier should operate successfully for many years if installed correctly. However, should any fault occur within 24 months of installation, irrespective of usage or application, the manufacturer undertakes to replace parts, or the whole unit, at their discretion, free of all labour or parts charges. However, should investigation of such a fault indicate operation of the unit outside its specification, then the manufacturer reserves the right to levy an appropriate repair charge.

Should a fault be suspected, your dealer should be notified in the first instance. All returns should be made via your dealer, forward carriage paid, and be accompanied by details of:

a the reported symptoms
b brief details of the installation.
c details of the circumstances of failure

Following the routine warranty period, Mustang amplifiers may be returned via your dealer, to the manufacturer for any necessary repairs or refurbishing. Details of the work required/reported fault must accompany the unit, and nominal charges will be levied.

CONTROLS AND OPERATION

Each input channel may be monitored by the front panel loudspeaker and associated selector switch and volume control. The monitoring point is at the 100 Volt line level at the output terminals. For MDS.*M units, which do not feature a 100 Volt line amplifier circuit, feeds from the the external monitored amplifiers must be returned to the MDS.*M unit to provide the necessary monitoring facility. The loudspeaker monitor facility is intended to enable the operator to confirm the programme integrity, and to enable initial setting up of VHF tuner modules, rather than for objective qualitative audio assessment.

Bass cut and treble boost controls and independent channel gain controls are internal adjustments. See Appendix A for their locations. Clockwise rotation will increase the gain, increase the treble, and reduce bass cut. Use a small screwdriver and do not force the adjustment at either end of its travel. These controls should be adjusted for personal preference.

The mains ON/OFF switch is of the rocker type and is operated by inward pressure at the top or bottom of the red front moulding. With mains power connected and the amplifier switched on, the switch will be internally illuminated, The amplifier will function within approximately one second, and when switching off it may continue to function for several seconds whilst the internal power supply discharges and at this point may cause a slight soft plop to be heard through the loudspeakers.

Certain input modules will also feature set-up adjustments and reference should be made to the corresponding module data later in this manual.

CASE - REMOVAL

Free standing cased amplifiers are dispatched with the case fitted and to make any internal adjustments or module changes it will be necessary to remove it. Turn the amplifier upside-down on a clean soft surface to avoid scratching and remove the four outer cross-point headed screws. Revert the amplifier and using strong finger pressure, push out the bottom flanges at both sides of the case, and slide it upwards over the chassis. Replacement is a reversal of this process. Line up the holes in case and chassis before attempting to re-fit the screws. Use the correct size of screwdriver.

The case is manufactured from PVC clad aluminium and therefore, whilst being washable it will not withstand any direct heat i.e. cigarettes, soldering irons etc.

INPUT MODULES AND CONNECTIONS - MDS.*M and MDS.*MA units

Due to the varying requirements of module input wiring, the module locations are determined at the time of manufacture, and will be detailed in the documentation supplied with the unit.
The input module system is designed for use with Mustang MDS, GA, VA, and MMA amplifiers, and provides facilities for the connection of any item of ancillary equipment, and incorporates the correct amount of tonal correction or equalisation where appropriate. As part of the range, tone generator modules are available featuring time delayed and/or instantaneous triggering where appropriate.
The MDS, GA, VA and MMA amplifiers are intended for permanent installation, and consequently the plug-in concept of the modules does not anticipate continuous or regular changing of modules. Whilst this is possible, the edge connector contacts will wear prematurely and become intermittent and unreliable. Modules are located between vertical supports immediately behind the respective front panel volume control, and only moderate force will be required when fitting or removing. DO NOT put pressure on the components during this operation. Input connections are made either via a dedicated coaxial aerial socket, or via a locking DIN 5-pin plug (Mustang Code 5-180). To insert:- rotate the plug until the pins line up with the corresponding socket contacts, and push fully in. Rotate the locking ring clockwise to secure. Similar plugs used for domestic Hi-Fi systems may be used though they are generally or a poorer quality, have a weaker cable clamp and will have no locking facility.

When connecting the input cables to the locking DIN plugs observe the following:-

a. DO NOT allow the cable braiding to contact the cable clamp, plug body or fixing screw. An earth/hum loop will result. This topic is fully covered elsewhere in this manual.

b. Application of silicon grease to the cable sleeve will facilitate easy insertion into the grommet.

c. Be careful when soldering. Avoid bridging adjacent pins of the locking DIN connectors with solder. If pins 4 and 5 are not to be used, break them off to provide extra space for soldering.

Special input facilities

Dependent upon the specification of the MDS unit, inputs to non-tuner modules will be via “Special Input Facilities” connectors” on the rear panel. Connections details are shown against the relevant module in the following section.

INPUT MODULES, CONNECTIONS & OPERATION

MODULE	FUNCTION
M.60	Multi-purpose balanced microphone & line, with phantom DC supply
M.60TB	Multi-purpose balanced mic/line, phantom DC. Treble & bass adjustment
L.50	Multi-purpose high level balanced line
M.6	Microphone 30-200 ohms, transformer balanced , with phantom supply
QM.6	Microphone 30-200 ohms, transformer balanced, three-tone chime, phantom supply
G.4	Phono-turntable pick-up with RIAA ceramic/magnetic equalisation
T.5	Line input, wide range sensitivity, unbalanced general purpose
L.5	Line input, transformer balanced, medium to high level input
TG.2	Tone generator - 1kHz tone pips and continuous tone
TG.3	Tone generator - 1kHz gongs
TG.5	Tone generator - Warble alarm and Dee-Dah alarm
XAM.2	Tuner, AM, fixed single station
VFM.4	Tuner, VHF. (For use with all except GA range amplifiers)
	Module developments
PM.6	Phantom powered microphone module. Facilities now incorporated into standard M.6 module
CM.6	Two-tone chime microphone module. Superceded by QM.6 three-tone chime
M.7	Microphone - high impedance. Obsolete
TG.1	Continuous sine wave tone generator. Facilities now incorporated into standard TG.2 module
TG.4	Tone generator - Dee-dah alternating alarm. Facilities now incorporated into standard TG.5 module

Table 1. The current range of input modules

M.60 & M.60TB Multi-purpose microphone & Line modules with phantom supply

These modules feature a high quality input transformer for balanced microphone or line operation. They may be used with conventional dynamic microphones, or phantom powered microphones and line level devices.
The M.60TB consists of an M.60 microphone module together with a sandwiched treble/bass card. A Baxendall derived circuit offers independent adjustment of treble and bass frequencies - both cut and lift. The adjustments are accessible from the top of the module.
The modules feature continuously variable sensitivity between low impedance microphone level and 0dB line level, by means of a GAIN trimmer and switchable attenuators, and is set at despatch to 1mV sensitivity. Other switch functions include:-

- ON/OFF stabilised +15 volt supply for use with phantom microphones or pre-amplified microphones
- ON/OFF bass-cut switch to enhance speech clarity for paging and similar applications, or for amplification through horn loudspeakers.
- ON/OFF earth lift for assisting with earth-loop problems.

The sensitivity (GAIN) control pre-set is located at the top of the module and may be operated by a small screwdriver. Rotate clockwise to increase sensitivity. Rotate the treble and bass controls to increases sensitivity. The centre position of each adjuster represents approximately flat response.
The PCB also includes two 4-pole DIL switches to cover all settings. DIL-A may be identified at the top of the module adjacent to the gain trimmer, whilst DIL-B is at the bottom. The switch poles are numbered on each switch body and the “ON” position is also shown. The various switch bars may be operated by the use of a small pointed instrument, ball-pen, etc.

Standard Locking DIN input socket connections

Pin 1	in phase	Balanced input
Pin 2	signal earth	
Pin 3	out of phase	
Pin 4	0V	(Priority channel only)
Pin 5	Priority control operate	

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired. See elsewhere in this manual for further details of priority facilities and operation.

SPECIFICATION

Input configuration	Transformer balanced. Centre tap may be switched free of earth.
Sensitivity	Variable 125uV @ 600 ohms to 2.6V @ 4k ohms by switch settings and trimmer.
Input overload margin	Nominally 35dB
Frequency response	-3dB @ 30Hz and 20kHz ref 1kHz
Treble & bass adjustm.	+/- 12dB @ 100Hz and 10kHz (M.60TB only)
Signal to noise ratio	Nominally 60dB @ 1mV
Bass-cut facility	Roll-off of approximately 6dB per octave below 200Hz. Switchable in/out
Phantom supply	+15V stabilised. Feeds via 2k7 ohm to each line. Factory set null. Switchable on/off.

M.60 & M.60TB DIL Switch functions

		DIL-A				DIL-B			
		1	2	3	4	1	2	3	4
Sensitivity variable	125uV - 2mV	off	on			off		on	on
Sensitivity variable	2mV - 20mV	on	off			off		on	on
Sensitivity variable	20mV - 300mV	on	off			off		off	off
Sensitivity variable	300mV - 2.6V	on	off			on		off	off
Bass cut filter in circuit					off				
Bass cut filter out of circuit					on				
Phantom supply on				on			on		
Phantom supply off				off					
Input transformer centre tap to earth							on		
Input transformer free of earth							off		

L.50 Multi-purpose high-level line module

This module features a high quality input transformer for balanced microphone or line operation. It may be used with a variety of input sources such as music equipment, remote amplification, and line level devices, etc. The module features continuously variable sensitivity by means of a gain trimmer and switchable attenuators, and is set at despatch to 775mV sensitivity. Other switch functions include:-

- ON/OFF bass-cut switch to enhance speech clarity for paging and similar applications, or for amplification through horn loudspeakers.
- ON/OFF earth lift for assisting with earth-loop problems.

A sensitivity (GAIN) control pre-set is located at the top of the module and may be operated by a small screwdriver. Rotate clockwise to increase sensitivity.
The PCB also includes 2 four-pole DIL switches to cover all settings. DIL-A may be identified at the top of the module adjacent to the gain trimmer, whilst DIL-B is at the bottom. The switch poles are numbered on each switch body and the “ON” position is also shown. The various switch bars may be operated by the use of a small pointed instrument, ball-pen, etc.

SPECIFICATION

Input configuration	Transformer balanced. Centre tap may be switched free of earth.
Frequency response	-3dB @ 30Hz and 20kHz ref 1kHz
Sensitivity	Variable 75mV to 100V @ 10k ohms by switch settings and trimmer.
Input overload margin	Nominally 32dB
Signal to noise ratio	Nominally 66dB @ maximum sensitivity
Bass-cut facility	Roll-off of approximately 6dB per octave below 200Hz. Switchable in/out

Standard Locking DIN input socket connections

Pin 1	in phase	Balanced input
Pin 2	signal earth	
Pin 3	out of phase	
Pin 4	0V	(Priority channel only)
Pin 5	Priority control operate	

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired.
See elsewhere in this manual for further details of priority facilities and operation.

L.50 DIL Switch functions

	DIL-A				DIL-B			
	1	2	3	4	1	2	3	4
Sensitivity variable 50mV - 600mV	on	on				off	off	
Sensitivity variable 500mV - 6V	on	on				on	off	
Sensitivity variable 6V - 100V	on	on				off	on	
Bass cut filter in circuit				off				
Bass cut filter out of circuit				on				
Input transformer centre tap to earth								on
Input transformer free of earth								off

M.6 Low impedance microphone module with Phantom supply (Later versions - M.6-2 onwards)

This module features a high quality input transformer for balanced line operation of dynamic microphones between 30 ohms and 600 ohms impedance, combined with a highly stable +15V DC supply for phantom powering of microphones. This facility was previously featured only in the PM.6 module.

The sensitivity is continuously variable by means of a trimmer resistor. Be careful to use a very small screwdriver blade. This control is marked “Gain” and is rotated anti-clockwise to increase sensitivity. When supplied, the gain is set to minimum (1mV for 200/600 ohm microphones) and should only be altered if found to be essential for correct operation. This will avoid prematurely overdriving the module into clipping distortion on peaks of sound. DO NOT force this control or intermittency will result. Generally an increase in gain will be necessary for 30ohm microphones.

On the component side of the board are three Molex style jumper sets. These operate as links which can be repostioned to enable/ disable various functions. Gently pull off the plastic bodied link and re-postion it on to the two pins adjacent to the required function, as follows:

PHANTOM When postioned in the OFF position, the module is for use with a conventional dynamic balanced microphone. In the ON position, (and with the 0V link in the Phantom position - see below) the phantom supply is energised. Dynamic microphones may still be used with the phantom supply operating, and without damage, though connection noises may occur if microphones are plugged/unplugged.

It will normally be necessary to reduce the “gain” of this module, too, for correct phantom operation.

BASS CUT If the jumper is repositioned to the BASS CUT location, then the specified bass roll-off will be enabled. Its operation is suitable for enhancing speech clarity for paging and similar applications, or for amplification through horn loudspeakers.

0V LIFT In the NORMAL position, the transformer is conventionally balanced about 0V. In the PHANTOM postion, the configuration is for balanced phantom supply and must be in this position (with the PHANTOM jumper also set to ON) for phantom powering to be enabled.

If this jumper is removed completely (or parked on one pin only) and the Phantom jumper set to OFF, then the configuartion is dynamic balanced floating, which may be useful where signal earth conflicts are being experienced. This is occasionally referred to as “lifting the earth”.

Standard Locking DIN input socket connections

Pin 1	in phase audio (& +15V DC Phantom power)	Balanced input
Pin 2	0V return (cable braid)	
Pin 3	out of phase audio (& +15V DC Phantom power)	
Pin 4	0V	
Pin 5	Priority control operate	(Priority channel only)

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired. See elsewhere in this manual for further details of priority facilities and operation.

SPECIFICATION

Input configuration	Transformer balanced. Centre tap optionally to 0V by pin header & jumper link
Phantom supply	Optionally, by pin header and jumper link: 15V DC stabilised. Factory set null.
Sensitivity	Variable 100uV @ 30 ohms to 1mV @ 200 ohms.
Input overload margin	46dB to 26dB
Frequency response	-3dB @ 55Hz and 20kHz ref 1kHz
Signal to noise ratio	Nominally 60dB @ 1mV
Bass cut	Optionally, by pin header and jumper link: Roll-off of approximately 6dB per octave below 200Hz

PM.6 Combined low impedance microphone and phantom DC supply

The PM.6 module is fully superceded by the standard M.6 module (from issue M.6-2 onwards). The PM.6 module is described here for completeness.

This module offers a high performance transformer balanced input combined with a highly stable +15 Volt DC supply for the phantom powering of microphones.

Standard Locking DIN input socket connections

Pin 1	in phase audio (& +15V DC)	
Pin 2	0V return (cable braid)	Balanced input
Pin 3	out of phase audio (& +15V DC)	
Pin 4	0V	
Pin 5	Priority control operate	(Priority channel only)

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired.
See elsewhere in this manual for further details of priority facilities and operation.

SPECIFICATION

Input configuration	Transformer balanced. Primary side held at +15V above signal earth by on board stabiliser and feed resistor to each input leg. Factory set DC balancing. Signal earth to amplifier input socket.
Sensitivity	Variable 100uV @ 30 ohms to 1mV @ 200 ohms.
Input overload margin	46dB to 26dB
Frequency response	-3dB @ 55Hz and 20kHz ref 1kHz
Signal to noise ratio	nominally 60dB @ 1mV
Bass cut option	Cut green wire link to introduce bass roll-off of approximately 6dB per octave below 200Hz

CM.6 Combined low impedance microphone module and ding-dong chime
CM.6 has been generally superceded by QM.6 module, and the following details are to assist maintenance and service requirements. Original details and assistance are freely available by contacting our service department.

The CM.6 consisted of an original specification M.6 module combined with a two-tone chime generator board.
Please note that the original specification M.6 did not feature phantom powering, molex jumpers for bass-cut or 0V earth lift.
The green wire link for the bass cut is located on the print side of the board. The flying lead of the CM.6 should be connected to the printed circuit board pin marked "- trigger" adjacent to the module rear support on the main circuit board. This is the trigger connection and operates simultaneously with priority access and therefore the CM.6 should always be used in a priority module position. Injection of the "ding-dong" signal relative to the microphone signal is adjusted by the small trimmer resistor marked "INJECTION" and the best setting will be found by experiment.
The trimmer resistor on the chime PCB marked "PITCH" adjusts both the speed and pitch of the chime sequence simultaneously.

Standard Locking DIN input socket connections

Pin 1	in phase audio	
Pin 2	Signal earth	Balanced input
Pin 3	out of phase audio	
Pin 4	0V	(Priority channel only)
Pin 5	Priority control operate	(Priority channel only)

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired.
See elsewhere in this manual for further details of priority facilities and operation.

SPECIFICATION

Input configuration	Transformer balanced. Centre tap to signal earth on module, and to amplifier input socket.
SensitivityVariable	100uV @ 30 ohms to 1mV @ 200 ohms.
Input overload margin	46dB to 26dB
Frequency response	-3dB @ 55Hz and 20kHz ref 1kHz
Signal to noise ratio	nominally 60dB @ 1mV
Bass cut option	Cut green wire link to introduce bass roll-off of approximately 6dB per octave below 200Hz
Chime frequencies	Variable - approximately 1000/888Hz
Chime duration	Variable - approximately 2 seconds

QM.6 Combined low impedance microphone module, triple chime, and phantom supply (from issue QM.6-1 onwards)

This consists of a version of an M.6 module combined with a three-tone chime generator board.
For information on gain adjustment, bass cut, 0V earth lift, phantom supply, etc., see M.6 details above. The flying lead of the QM.6 should be connected to the printed circuit board pin marked "- trigger" adjacent to the module rear support on the main circuit board. This is the trigger connection and operates simultaneously with priority access and therefore the QM.6 should always be used in a priority module position. Injection of the "ding-dang-dong" signal relative to the microphone signal is adjusted by the small trimmer resistor marked "CHIME INJECT" and the best setting will be found by experiment.
The trimmer resistor on the chime PCB marked "CHIME PITCH" adjusts both the speed and pitch of the chime sequence simultaneously.

Standard Locking DIN input socket connections

Pin 1	in phase	
Pin 2	signal earth	Balanced input
Pin 3	out of phase	
Pin 4	0V	
Pin 5	Priority con trol operate	(Priority channel only)

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired.
See elsewhere in this manual for further details of priority facilities and operation.

SPECIFICATION

Input configuration	Transformer balanced. Centre tap to signal earth on module, and to amplifier input socket.
Sensitivity	Variable 100uV @ 30 ohms to 1mV @ 200 ohms.
Input overload margin	46dB to 26dB
Frequency response	-3dB @ 55Hz and 20kHz ref 1kHz
Signal to noise ratio	nominally 60dB @ 1mV
Bass cut	Optionally, by pin header and jumper link: Roll-off of approximately 6dB per octave below 200Hz
Chime frequencies	Variable - approximately 1000/888/626Hz
Chime duration	Variable - approximately 2.5 seconds

M.7 High impedance microphone/general purpose module

Obsolete module but shown here for completeness.
This module is for use either with high impedance microphone or ancillary sound sources with low level equalised outputs. Two pre-set sensitivities are available, selected by two alternative connections at the input socket. The 50mV connections would normally be used either for microphones or low output tape head pre-amplification etc. The 15mV connections provides extra sensitivity but as with all input modules this could lead to early onset of clipping distortion on peaks of sound if care is not exercised. The green wire link on the component side of the board provides a bass cut filter if cut. Its attenuation is approximately 3dB per octave below 200Hz and is suitable for enhancing speech clarity for paging and similar applications, or for amplification through horn loudspeakers. Bend the cut ends of the link apart to prevent accidental contact.

Standard Locking DIN input socket connections

Pin 1	50mV (.05V) input	
Pin 2	signal earth (cable braiding)	
Pin 3	15mV (.015V) input	
Pin 4	0V	}
Pin 5	Priority control operate	} (Priority channel only)

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired.
See elsewhere in this manual for details of priority facilities and operation.

SPECIFICATION

Input configuration	Unbalanced audio relative to signal earth
Sensitivity	Selectable at input socket 15mV @ 33k ohm or 50mV @ 47k ohm
Input overload margin	26dB
Frequency response	-3dB @ 55Hz and -1dB 20kHz ref 1kHz
Signal to noise ratio	Nominally 60dB
Bass cut option	Cut green wire link to introduce bass roll-off of approximately 6dB per octave below 200Hz

G.4 Magnetic and ceramic pick-up module for record players

This module is a variable sensitivity module suitable for mono or stereo magnetic or ceramic (crystal) pick-ups. The sensitivity when supplied is set to minimum - "C" (suitable for ceramic cartridges) by means of the small trimmer resistor. By rotating the control carefully anti-clockwise by means of a very small screwdriver blade towards the "M" position, the sensitivity will increase to a level suitable for magnetic cartridges. DO NOT force this control or intermittency will result. Be careful to establish the type of cartridge in use and adjust the module accordingly. If incorrectly determined, the result will be either exceptionally low or high amplification of the signal. In the latter case severe distortion will arise and the front volume control operation will probably be cramped between position 0 and 1. Be careful to maintain the correct stereo signal phasing on the input plug, as, if the left and right signals are out of phase the result will be strangely hollow and un-natural amplification with distortion. Always adjust the trimmer resistor to the minimum sensitivity possible for normal operation of the front volume control.

Standard Locking DIN input socket connections

Pin 1	input left or right or mono
Pin 2	signal earth (cable braiding)
Pin 3	input left or right or mono

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired.

SPECIFICATION

Input configuration	Two unbalanced audio inputs, passively mixed relative to signal earth.
Sensitivity	Variable 4mV to 90mV @ 47k ohm.
Equalisation	RIAA
Input overload margin	47dB to 68dB @ 1kHz
Signal to noise ratio	60dB to 68dB

T.5 CD/Tape/Radio general purpose unbalanced line input module
(from issue T.5-1 onwards)

This module would be selected for use with most tape players, radio tuner units, mixers, pre-amplifiers, etc., with output signal levels of between 50mV and 5V. Two pre-set sensitivities are provided by alternative connections at the input socket and the equipment manufacturers handbook should be consulted to determine the most suitable connection. A variable level control provides a further 20dB of attenuation. The 50mV connections would not normally be used for signal levels greater than approximately .75Volt as the input overload margin would be exceeded leading to premature clipping distortion on sound peaks.

Standard Locking DIN input socket connections

Pin 1 775mV input (variable 500mV - 5V)
Pin 2 signal earth (cable braiding)
Pin 3 50mV input (variable 50mV - 500mV)
Pin 4 0V (Priority channel only)
Pin 5 Priority control operate (Priority channel only)

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired. See elsewhere in this manual for further details of priority facilities and operation.

SPECIFICATION

Input configuration	Two unbalanced audio inputs relative to signal earth, unmixed.
Sensitivity	Selectable at input socket 50mV @ 47k ohm or 775mV @ 400k ohm
Level control	20dB additional attenuation. Factory set at 0dB attenuation
Input overload margin	26dB (46dB)
Frequency response	-3dB @ 20Hz and -1dB 25kHz ref 1kHz
Signal to noise ratio	nominally 65dB (85dB)

L.5 Balanced floating line input module
(from issue L.5-1 onwards)

This module would be selected for use with sound mixers and zero level output (775mV nominally), amplifier loudspeaker outputs, and existing loudspeaker line systems up to 100V. One particularly useful feature is that the input connections are totally free of earth thereby automatically preventing earthing and earth/hum loop problems. A Level control and two general sensitivity ranges are provided by alternative connections at the input socket and the equipment manufacturers handbook or the installation contractor should be consulted to determine the most suitable connection. The 250mV-2.5V connection would NOT NORMALLY be used with amplifiers EXCEEDING the following ratings -

15 Volt line output i.e. 50/70/100V
15 watts into 16 ohms
30 watts into 8 ohms
55 watts into 4 ohms

No damage is likely to be caused to the module if these ratings are exceeded though distortion will tend to occur on sound peaks. If in doubt, use the 3.5V-42V connection. The loading provided by the L.5 module is negligible.

Standard Locking DIN input socket connections

Pin 1	3.5V - 42V input	floating
Pin 2	300mV - 3.5V input	free of
Pin 3		earth
Pin 4	0V	
Pin 5	Priority control operate	(Priority channel only)

See elsewhere in this manual for further details of priority facilities and operation.

SPECIFICATION

Input configuration	Dual sensitivity, transformer balanced, floatings.
Sensitivity	Selectable at input socket 0.3V-3.5V @ 10k ohm or 3.5V-42V @ 150k ohm
Input overload margin	30dB (50dB)
Frequency response	-3dB @ 30Hz and -1dB 20kHz ref 1kHz
Signal to noise ratio	nominally 85dB (105dB)

XAM.2 AM Single station tuner

This circuit module is a completely self-contained crystal-controlled, AM radio tuner incorporating RF, IF, and AF amplification, two RF tuned circuits to aid image rejection, a ceramic filter for greater selectivity, an IF rejection filter, AGC, and a control to pre-set the AF output.
The crystal oscillator used in this circuit commits the module to the reception of one station only, and all tuned circuits are set on manufacture to optimise on performance at this frequency. Therefore no adjustments except to the AF output pre-set resistor should be made.

For optimum results, the antenna system should be fitted with a 75 ohm downlead which will connect directly to amplifiers with a standard 75 ohm coax antenna socket. If the module cannot be used in the dedicated input module position, and where signal strength permits, the coax may be connected to the corresponding locking DIN socket as follows -

Pin 1 Inner
Pin 2 braid
Pin 3 N/C

DO NOT allow the cable braiding to contact the cable grip of the DIN connector, or a earth/hum loop will result, and interference suppression may be impaired.

To assist in setting the system up, a signal strength arbitrary voltage test pin is located at the top rear. Tune or orientate the antenna for the highest reading.

SPECIFICATION

Input configuration	Fixed frequency radio tuner system, in the range 1.5MHz to 600kHz. Factory set.
Sensitivity	Better than 6uV @ 75 ohms for 26dB S/N
Controls	Audio gain
Features	Automatic RF/IF gain control
	Quad tuned 470kHz IF
	Double tuned RF pre-selector

VFM.4 VHF/FM Single selectable station tuner

This module may be used only in the position specified in the documentation supplied with the MDS unit. A 75ohm coaxial downlead from the antenna system should be connected to the dedicated aerial socket at the rear panel.
The construction is of two circuit boards mounted back to back on which is contained a complete tunable VHF radio tuner, including RF, IF, and AF amplification, FM demodulation, AGC, variable squelch, supply stabilisation, and AFC. User adjustments are provided for variable squelch, and AF output, and all other adjustments are factory set.
The modules feature an on-board helical potentiometer for accurate selection of a single station.
Connection pins are provided for the purpose of disabling the AFC to assist initial tuning of weak stations.
Upon manufacture, the squelch is adjusted such that this is defeated by signals greater than 8uV, ensuring full attenuation of RF noise when the transmitting station closes down.

To tune into a station, adjust the helical pre-set resistor (accessible at top rear) clockwise to increase frequency up to 108MHz or anti-clockwise to lower frequency to 88MHz until the required station is located.

It is normally necessary to tune to the centre frequency of the required station and this is most easily accomplished by shorting the two PCB pins at the top of the module in order to defeat the AFC, for each tuning operation. Now, by turning the pre-set carefully a position will be found where the station is received without distortion. Removing the short will re-instate AFC and account for frequency drift caused by temperature change etc. It is possible that when attempting to tune a weak station, which is transmitting on a frequency adjacent to a much stronger station, that the AFC when re-instated will cause the module to lock onto the stronger station.
There are two possible ways of overcoming this:- firstly by the use of a more directional antenna beamed at the weaker station. Alternatively, it should be possible to de-tune to the opposite side of the weak station. In any event, check that the tuner locks onto the correct station by turning the amplifier off and on - the tuner will briefly sweep through all the stations and may still lock onto the stronger signal.
Signal strength comparison measurements may be made by connecting a high resistance voltmeter between the earth link (central) and AGC link (rear) at the top of the module. With antenna disconnected, the reading should be in the order of 4.5Volts DC. With the antenna re-connected, and a signal tuned in, this reading will drop by an amount dependent upon signal strength, although not linearly. With AFC disabled as above, this AGC reading will enable a more accurate tuning to any particular station.
Squelch adjustments are facilitated by the small pre-set potentiometer at the bottom of the module. The squelch threshold level may be reduced by turning this control VERY SLIGHTLY anti-clockwise.
Audio output may be adjusted by turning the pre-set potentiometer which is situated towards the top of the module.

SPECIFICATION

Input configuration	Voltage tuned VHF radio tuner system, for the range 88MHz to 108MHz. On board selection. 75 ohm input.
Sensitivity	Better than 3uV @ 75 ohms for 40dB S/N
Image rejection	70dB
AGC threshold	Operates for signals greater than 25uV
AFC capture limits	250kHz @ 25uV
Module adjustments	Audio gain
	Squelch - factory set to 8uV

TG.1 Sine wave tone generator

The TG.1 module is fully superceded by the standard TG.2 module (from issue TG.2-1 onwards). The TG.1 module is described for completeness.

This module is useful for the setting up and matching of sound system components, or it may be used as an alarm tone. External triggering may be enabled by connection of a distant "make" switch to the tone trigger pin and signal earth pin at the Locking DIN input socket, or alternatively the module may be internally triggered by bridging a wire link between the two pins on the module itself. The tone will be generated for the duration of the "make" switch contact, and as the external triggering is at a very low current level, the cable used to connect it need only by a very light duty twin conductor of any length.
Whenever the TG.1 is oscillating, a signal of approximately 1V RMS at 47K ohm source impedance will appear at the channel input socket and this may be used to drive a remote amplifier etc.

Standard Locking DIN input socket connections

Pin 1 Tone trigger
Pin 2 signal earth
Pin 3 1V RMS auxiliary signal output
Pin 4 0V (Priority channel only)
Pin 5 Priority control operate (Priority channel only)

SPECIFICATION

Tone character	Uninterrupted sine wave
Triggering	On PCB or external make switch
Tone duration	Duration of trigger
Auxiliary output	1V RMS @ 47k ohm
Adjustment	Tone pitch 750-1350Hz

TG.2 1kHz time pips and test-tone generator (later versions - TG.2-1 onwards)

The TG.2 module now incorporates the facilities of the earlier TG.1 module.
This module is triggered externally via the appropriate channel by any pair of "make" switch contacts. Either continuous pips or a series of up to 10 pips or a continuous tone or tone burst may be triggered depending on the connections and jumper settings. The pip group or tone burst may be triggered by momentary or permanent switch contacts. Triggering takes place at a very low current level and the cable may be of any length and of very light duty twin conductor type. The PITCH of the tonemay be adjusted by the trimmer on the module, using a very small screwdriver blade. DO NOT force this control.

Standard Locking DIN input socket connections

Pin 1 trigger for continuous pips or uninterrupted tone
Pin 2 signal earth
Pin 3 trigger for one group of of pips, or for tone burst
Pin 4 0V (Priority channel only)
Pin 5 Priority control operate (Priority channel only)

SPECIFICATION

Tone character	Continuous 1kHz sine wave tone or interrupted 1kHz sine wave. 100mS on, 900mS off.
Triggering	External make switch, momentary or continuous
Tone duration	Duration of continuous trigger, or approximately up to seconds single cycle for momentary.
Timer	Duration of group of pips or of tone burst set by TIMER trimmer approximately 1second to 10 seconds
Pitch adjustment	Approximately 750-1350Hz
Mode Selection	Pips or uninterrupted tone by Molex style pin header and jumper

TG.3 Repeating gong generator (later versions - from issue TG.3-1 onwards)

This module is triggered externally via the appropriate channel by any pair of make contacts. Either continuous gongs or up to 10 seconds of gongs may be triggered depending on the connections. The timed duration of gongs may be triggered by momentary or permanent switch contacts. Triggering takes place at a very low current level and the cable may be of any length and of very light duty twin conductor type. The frequency of oscillation may be adjusted by the trimmer resistor on the module, using a very small screwdriver blade. DO NOT force this control.

Standard Locking DIN input socket connections

Pin 1 Continuous trigger for gongs
Pin 2 Signal earth
Pin 3 Momentary trigger for timed group of gongs
Pin 4 0V (Priority channel only)
Pin 5 Priority control operate (Priority channel only)

SPECIFICATION

Tone character	1kHz gongs at 1 second intervals
Triggering	External make switch, momentary or continuous
Tone duration	Continous gongs for duration of continuous trigger, or a timed single group of gongs using momentary trigger.
Timer adjustment	Approximately 1 second to 10 seconds by PCB trimmer
Pitch adjustment	Approximately 750-1350Hz

TG.4 Alternating alarm tone generator

The TG.4 module is fully superceded by the standard TG.5 module (from issue TG.5-1 onwards). The TG.4 module is described for completeness.

This module is triggered externally via the appropriate channel input socket by any pair of “make” switch contacts connected between the trigger and signal earth pins of the Locking DIN input socket. The alarm signal will be generated for the duration of trigger contact and as triggering takes place at a very low current level, the cable may be of any length and of very light duty twin conductor type.
Whenever the alarm generator is operating, an auxiliary signal output will appear at the input connector. The frequencies of oscillation are adjusted by the trimmer resistor on the module. Use a very small screwdriver blade and DO NOT force this control.

Standard Locking DIN input socket connections

Pin 1	trigger	
Pin 2	signal earth	
Pin 3	1V RMS auxiliary signal output	
Pin 4	0V	(Priority channel only)
Pin 5	Priority control operate	(Priority channel only)

SPECIFICATION

TG.4 Tone character	Alternating fixed frequency tones of 1000Hz & 700Hz approximately, at 0.5 second intervals
Triggering	External momentary make switch
Tone duration	Duration of trigger
Auxiliary output	1V RMS @ 33k ohm
Adjustment	Tone pitch

TG.5 Warble and Dee-Dah alarm tone generator (later versions - from issue TG.5-1 onwards)

This modules now also incorporates the features originally provided by the TG.4 module.
The TG.5 is triggered externally via the appropriate channel input socket by any pair of “make” switch contacts connected between the trigger and signal earth pins of the Locking DIN input socket. The alarm signal will be generated for the duration of trigger contact and as triggering takes place at a very low current level, the cable may be of any length and of very light duty twin conductor type.
Whenever the alarm generator is operating, an auxiliary signal output will appear at the input connector. The frequencies of oscillation are adjusted by the trimmer resistor on the module. Use a very small screwdriver blade and DO NOT force this control.

Standard Locking DIN input socket connections

Pin 1	trigger	
Pin 2	signal earth	
Pin 3	1V RMS auxiliary signal output	
Pin 4	0V	(Priority channel only)
Pin 5	Priority control operate	(Priority channel only)

SPECIFICATION

Dee-Dah tone character	Alternating fixed frequency tones of 1000Hz & 700Hz approximately, at 0.5 second intervals
Warble tone character	Single tone sweeping between 1000Hz & 700Hz approximately, on a 0.25 second continuous cycle
Triggering	External momentary make switch
Tone duration	Duration of trigger
Auxiliary output	1V RMS @ 33k ohm
Adjustments	Tone pitch Speed of Warble/Dee-dah
Tone selection	By Molex type pin header and jumper on PCB: Dee-dah or Warble

INPUT CONNECTIONS for MDS.*A amplifier

The standard specification locking DIN signal input connections are:-

Pin 1 No connection
Pin 2 signal earth (cable braiding)
Pin 3 .775v @ 47k ohms power amplifier input

These amplifiers have an internal adjustment for sensitivity. See Appendix A for location.

Immediate technical advice for specific problems is available from the Technical Services Department, Mustang Communications Ltd.

Please also see page 16 regarding earthing and earth/hum loops.

POWER AMPLIFIER SECTION - MDS.*MA and MDS.*A units

This section of the amplifier circuit consists of a very stable DC coupled driver circuit built in the form of a two channel module. The basic circuit has been designed to deliver the full rated power direct into 100 Volt line loads of 10 Watts by means of the module mounted output transformer. Each of the two amplifier circuits features a pre-settable sensitivity control. Rotate fully clockwise for full sensitivity.
Distortion and noise level have been kept at very low levels consistent with wide bandwidth. No adjustments other than sensitivity are provided and the module includes automatic dissipation limiting protection circuitry. For impedance and loads which cause overloading of the amplifier section, the protection circuitry becomes operative progressively.

LOUDSPEAKER CONNECTIONS - MDS.*MA & MDS.*A units

The amplifier is designed to work only with 100 Volt line loads, each of which must not exceed 10 Watts loading.
IT IS ESSENTIAL to provide the correct loudspeaker load for safe and distortion-free reproduction.

Most 100 Volt line loudspeakers use a transformer which can be 'tapped' at various Wattages so that each loudspeaker may be adjusted individually to provide the sound level required. All the loudspeakers should be wired in parallel across the corresponding output terminals at the rear of the amplifier.

When designing a line loudspeaker system, bear in mind future adjustments which may be required to individual loudspeakers. These may increase the loading beyond safe limits. Some loudspeakers are also inaccurately rated regarding loadings.

LINE INPUT/OUTPUT CONNECTIONS

The pin connections are as follows:-

Pin 1 .775V @ 600 ohms direct access from pre-amplifier
Pin 2 signal earth (cable braiding)
Pin 3 .775V @ 10K ohms direct access to the power amplifier
Pin 4 no connection
Pin 5 no connection

Tape recording & playback

For tape RECORDING use either Pin 1 or 3 of the mixer facility socket. Ensure from the manufacturer's handbook that the recorder will accept signal levels of approximately 0.75V without distortion and that the recorder does not short out the signal recording connections when in the playback mode. In either case, insert a resistor of suitably high value in series with the recording lead. For recording on a stereo recorder connect both signal input connections together to pins 1 or 3.

For TAPE PLAYBACK it would be preferable to use an M.7 or T.5 input module. However, the power amplifier amplifier may be injected directly with a tape recorded signal by connection to Pin 3 providing that the recorder can develop a signal level approaching 0.75V and can deliver this undistorted into a 10K ohm load.

INSTALLATION

Selection of signal input cables

For MDS units featuring only tuner modules, it is necessary to provide a good quality, low-loss 75 ohm downlead from the aerial system to the dedicated rear socket. Signal splitting between VHF and AM/MW signals takes place within the amplifier.
When an MDS unit has been specified with other (audio) plug-in modules, it is essential that input connections are made carefully, using appropriate screened cable, soldered to DIN connector plugs, and using the appropriate terminal numbers indicated in the section describing the input modules in this manual. Unscreened "telephone" type cables are NOT suitable. Either twin conductor, or single conductor types may be used depending upon the application. For long fixed cable runs, a cable with a conventionally braided outer shield is preferable to a lap-screened type. A conductive plastic shield type is ideal for cables which will be subject to constant flexing such as those connected directly to microphones. Failure to meet these requirements will result in inferior performance, and at worst, damage to the amplifier.
It is not possible in this manual to be specific about the exact types of input cable for use in any particular amplification system, as many practical factors will need to be taken into account. However, as a guide, we would recommend the following:

Balanced lines should be wired in twin, twisted core, screened cable with a conductor size of at least 0.22sq.mm., and preferably 0.5sq.mm. This is equally valid for dynamic or phantom-powered microphones, and line inputs.

Line level cables, such as those between a tape recorder and the amplifier, which may be up to a few metres in length are less critical and may be run using lap-screened, single or twin cable with conductors of 7/0.1mm or 7./0.2mm.

Selection of loudspeaker cables

Use of an appropriate cable for the connection of loudspeakers to the amplifier will ensure that a minimum amount of audio power is lost during transmission to the loudspeaker network. The loss will depend upon several factors - loudspeaker loadings, size of cable conductor, length of cable, etc.
As a general rule, for any particular loudspeaker system, the longer and the thinner the cable, the greater will be the loss. We therefore recommend, that the system is planned such that the amplifier is as near as possible to the loudspeakers, and that the cable used is as large as practicable.
Whilst it is not possible to be specific about the precise cable to be used in any particular system, we would suggest twin conductors of 0.50sq.mm cross-sectional area for loudspeakers located up to 50Mtrs away. Either solid or flexible conductor cables may be used, or a combination of both. It would be appropriate for a heavy duty cable to be used between the amplifier location and the general loudspeaker location, and for the subsequent loudspeakers of the network to be interconnected with thinner cable.

Siting

The position chosen for installation of the amplifier will depend upon many individual factors outside the scope of this manual. Generally speaking, coaxial aerial leads, and other audio input leads should be as short as possible. Please also refer to the following paragraph on ventilation. Choose a position where there is little likelihood of any liquid being spilled on the amplifier.

Ventilation

Units in the MDS range develop very little heat when switched on and not in use. MDS.*M pre-amplifiers develop virtually no heat in use and need minimal ventilation. MDS.*MA and MDS.*A amplifiers develop moderate amounts of heat dependent upon the amount of sound power delivered to the loudspeaker loads. Rack mounting amplifiers in irregular or spasmodic use may be stacked as required provided that there is sufficient free flowing air at the rear. If the amplifiers are to work hard and/or permanently, then ideally, a 1U space should be provided between every second amplifier.
The amplifiers' naturally long operational life may be realised by a cool operating environment.

To summarise, if MDS amplifiers are to be used at high power levels do not:-

a) install in small enclosed cupboards
b) stack in rack cabinets without adequate cooling, spacing, or ventilation
c) install above radiators or near heaters
d) block-in side and/or bottom surfaces

Power requirements

The power requirement for the amplifier, even when used at full power, is minimal and should be taken from the AC mains supply via a 3 core flexible cable. It is vital that the connections to the mains input line socket are made to the correct terminals and that a suitable earth connection is available.
DO NOT operate the amplifier under any circumstances without an electrical earth connected.

Earthing/hum loops

A hum loop is most likely to be the cause of a distinct and sharp hum or buzz in the loudspeakers. It will not be influenced by internal adjustments, and is caused, generally speaking by a conflict of earthing requirements when two earthed units are interconnected. They may be a tape deck and an MDS for example, or an MDS whose Mixer Facility connection is taken to a remote power amplifier. Alternatively it may be due to a short circuit inside the input plug (see page 5 regarding connection of plugs). Confirmation of a loop can be made by removing all the signal input and output plugs. The hum should disappear, only to return when the offending input plug(s) are replaced. (See also page 17 regarding faults, "8 - parasitic oscillation").

The input socket signal earth connections are internally earthed via the input modules to the mains earth via the chassis. If ancillary equipment e.g. tuners/tape players/record players etc., are to be connected to the unit, steps must be taken to ensure that the signal cable braiding is not already earthed before reaching the units, otherwise a hum loop will be formed. Use an AVO meter or equivalent to check this. It should be possible in high quality equipment to disconnect the ancillary equipment earth from its chassis connection thereby breaking the loop. Some ancillary equipment is not normally connected to the mains earth via its mains lead, relying on "double insulation", and in such cases, the signal earth is automatically free of mains earth. A hum loop may also be broken by the use of an L.5 input module for certain applications. This module operates with input circuitry fully floating free of earth.

DO NOT OPERATE THE AMPLIFIER UNDER ANY CIRCUMSTANCES WITHOUT AN ELECTRICAL EARTH CONNECTED VIA THE MAINS CONNECTION.

Interference

Steps have been taken in the designs of the range to minimise interference from external sources. The main possibilities would be -

a) faulty or insufficiently suppressed dimmer
b) incorrectly shielded or earthed lighting dimmer
c) lighting dimmer lines close to signal input lines
d) strong radio/TV transmission immediately adjacent
e) faulty fluorescent tubes or tube fittings
f) un-suppressed heavy electrical contacts
g) stray magnetic fields from other mains equipment adjacent
h) computer, calculator, or related equipment

The source of interference should be established by elimination and logic, and equipment repaired or modified accordingly, rather than attempting modifications to the amplification equipment.

FUSES

A positive DC and a negative DC fuse are featured on each power output module. In the event of serious failure of either power amplifier stage on the module, the resulting fuse failure will cut out both amplifiers of the module. If one of these fuses blows repeatedly, an internal or external fault is indicated. It is unrealistic in these circumstances to suggest a "weak fuse". Do not attempt to force the amplifier by fitting fuses of a higher rating.
When replacing fuses, disconnect the AC mains supply and allow a few minutes for capacitors to discharge. The fuses, their functions, values and locations are shown in Appendix A.

FAULTS

The following list of fault symptoms and check points cannot be considered as comprehensive, but as a guide to the most likely faults and causes. We assume that the input sources and loudspeakers are properly connected and in good working order. Be sure to check these carefully first before investigating the amplifier.

FAULT SYMPTOM	CHECKLIST
1.Sound off, lamp off	Mains fuse, mains lead, mains power, mains switch.
2.Sound off, lamp on	DC fuses, HT voltages, output transistors, input connections, module edge connectors, output transformer continuity. VHF tuner module squelch setting incorrect.
3.Sound faint	Module sensitivity adjustment, incorrect output connections, overload on mixer facility socket, incorrect input pin selection, incorrect choice of input module. Insufficient RF signal to AM tuner module.
4. Sound loud but distorted	Incorrect choice of input module, incorrect module sensitivity setting or pin selection, incorrect loudspeaker load, volume control too far advanced, system requires amplifier of greater power or more efficient loudspeakers, master control set too low. Incorrectly adjusted tuner module.
5.Sound distorted on bass peaks	Bass controls too high, poor quality 100V line loudspeaker transformers. See also No.4 above.
6.Sound distorted and faint	Incorrect choice of input module, incorrect module sensitivity setting or pin selection, incorrect loudspeaker load, partial loudspeaker line short, output transformer short circuit, master control set too low.

7.Case gets very hot	Incorrect (excess) loudspeaker loadings, see page 15, parasitic oscillation (usually accompanied by soft hum and mild distortion and appears and disappears at a certain treble control setting), see 8 below, insufficient ventilation, see page 16
8.Parasitic/supersonic	Insufficientscreening on high sensitivity input signal cables, insufficient earthing, loudspeaker/ input leads adjacent or parallel for some length, unloaded input line, incoming parasitic on signal line from ancillary equipment, braiding on input cable disconnected or intermittently faulty.
9.Soft hum - controls ineffective	Earth/hum loop; see page 16, power supply capacitor failing, induced magnetic field from nearby mains equipment.
10.Hum	Incoming hum from ancillary equipment, induced hum on sensitive input cables, incorrect earthing to MDS amplifier or ancillary equipment, earth/hum loop; see page 16.
11. Hiss	Excess treble, signal noise incoming from ancillary equipment, AM tuner module not receiving input signal, noisy input module.
12. Fizz	Interference from dimmers, dimmer lines, faulty fluorescent lights, earth/hum loop; see page 16. AM aerial or downlead picking up interference.
13. Loud harsh hum or buzz	Disconnected signal input braiding,earth/hum loop; see page 16. Unshielded AM aerial downlead
14. Intermittent loud crack	Strained input module edge, dirty edge connectors, intermittent input lead connections, dirty mains plug pins, loose mains fuse, radiated interference from thermostat etc. see also No. 5 above.
15. Howling or ringing or booming	Acoustic feedback between or turntables or microphones and loudspeakers.
16. DC fuses blowing - fuses blackened	Failed output transistors
17. AC supply fuse blowing - fuse blackened	Mains switch suppressor shorted, rectifier failed, mains transformer failed.
18. Intermittent sound	Loose input module or driver board edge connector, fractured input cable, worn volume control track. VHF signal on threshold of squelch setting.

REPAIRS AND MAINTENANCE

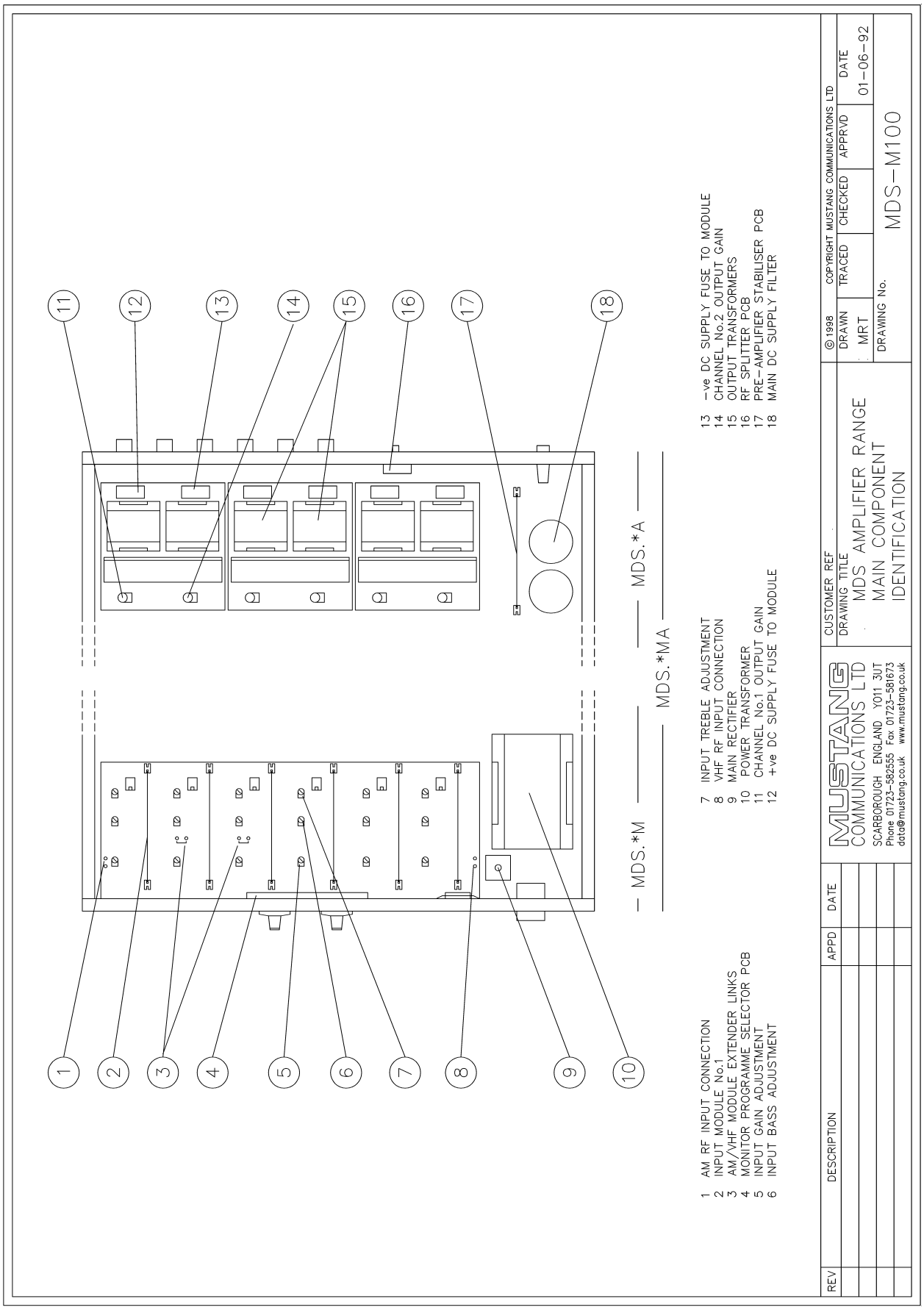
Should components be required for replacement purposes, these may be obtained without delay from the address on the cover of this manual. It would be preferable to use original specification components rather than improvise or modify the amplifier.

The MDS range of amplification has been planned so that servicing and maintenance is extremely uncomplicated. All main potential sources of failure are either pluggable or accessible from the top of the main circuit board. It is unlikely that the main board will ever need to be removed except for the removal of spilled liquid, or broken mechanical parts. Should a fault be suspected, your dealer should be notified in the first instance. All returns should be made via your dealer, forward carriage paid, and be accompanied by details of:

1 the reported symptoms
2 brief details of the installation.
3 details of the circumstances of failure

Following the routine warranty period, Mustang amplifiers may be returned via your dealer, to the manufacturer for any necessary repairs or refurbishing. Details of the work required/reported fault must accompany the unit, and nominal charges will be levied.

Immediate technical advice for specific problems is available from the Technical Services Department, Mustang Communications Ltd.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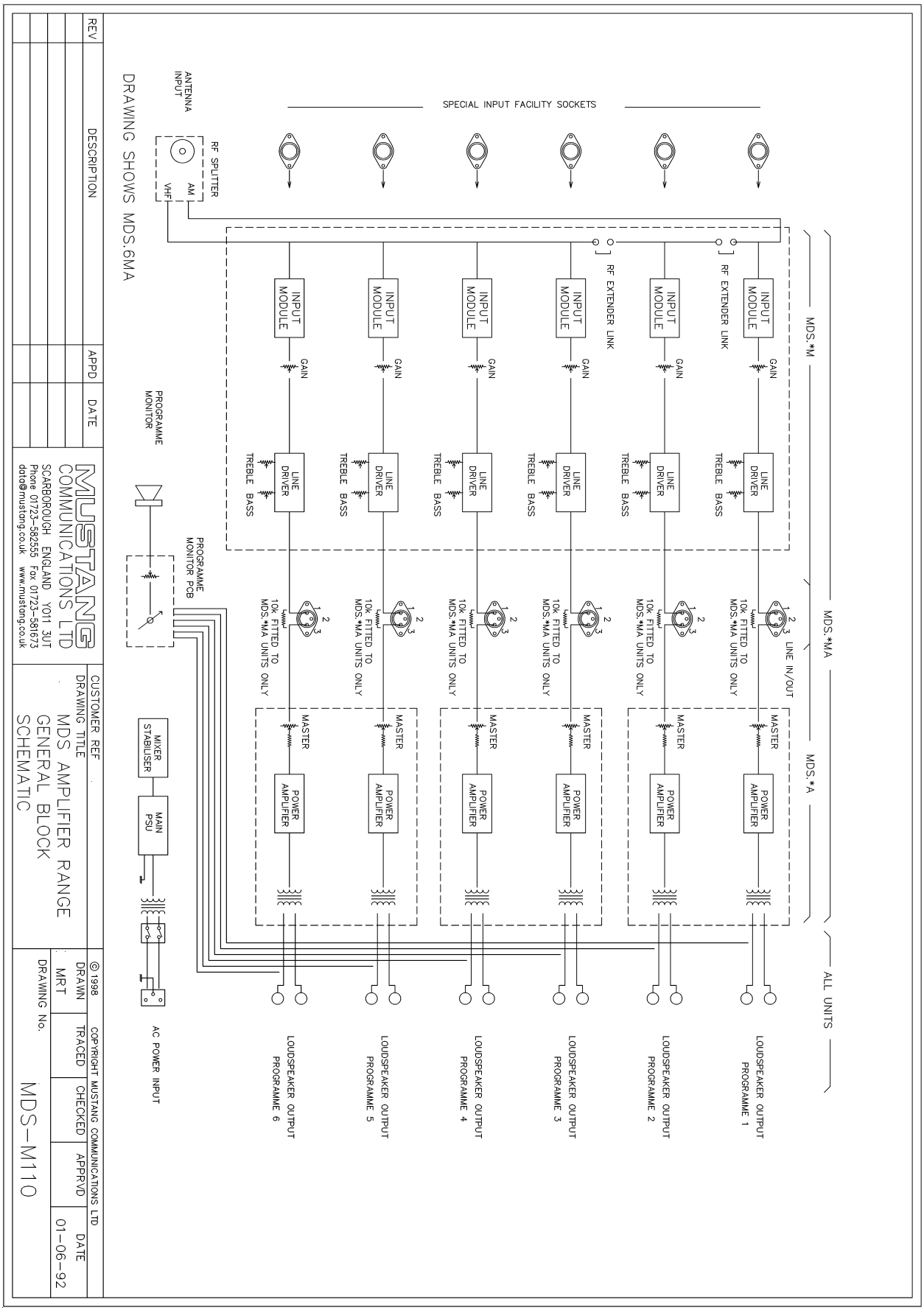
MDS.*M
MDS.*MA
MDS.*A
1 AM RF INPUT CONNECTION
2 INPUT MODULE No.1
3 AM/VHF MODULE EXTENDER LINKS
4 MONITOR PROGRAMME SELECTOR PCB
5 INPUT GAIN ADJUSTMENT
6 INPUT BASS ADJUSTMENT
7 INPUT TREBLE ADJUSTMENT
8 VHF RF INPUT CONNECTION
9 MAIN RECTIFIER
10 POWER TRANSFORMER
11 CHANNEL No.1 OUTPUT GAIN
12 +ve DC SUPPLY FUSE TO MODULE
13 -ve DC SUPPLY FUSE TO MODULE
14 CHANNEL No.2 OUTPUT GAIN
15 OUTPUT TRANSFORMERS
16 RF SPLITTER PCB
17 PRE-AMPLIFIER STABILISER PCB
18 MAIN DC SUPPLY FILTER
REV
DESCRIPTION
APPD
DATE
MUSTANG
COMMUNICATIONS LTD
SCARBOROUGH ENGLAND YO11 3UT
Phone 01723-582555 Fax 01723-581673
data@mustang.co.uk www.mustang.co.uk
CUSTOMER REF
DRAWING TITLE
MDS AMPLIFIER RANGE
MAIN COMPONENT
IDENTIFICATION
© 1998 COPYRIGHT MUSTANG COMMUNICATIONS LTD
DRAWN
TRACED
CHECKED
APPRVD
DATE
MRT
01-06-92
DRAWING No.
MDS-M100



REV	DESCRIPTION	APPD	DATE

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SCARBOROUGH ENGLAND YO11 3UT
Phone 01723-582555 Fax 01723-581673
dotd@mustang.co.uk www.mustang.co.uk

CUSTOMER REF

DRAWING TITLE
MDS AMPLIFIER RANGE
GENERAL BLOCK
SCHEMATIC

DRAWING No.
MDS-M110

DRAWN	TRACED	CHECKED	APPRVD
MRT			
DATE			
01-06-92			