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IRT Eurocard

Type AG-738

Stereo Audio Phase / Failure Detector

Designed and manufactured in Australia

IRT can be found on the Internet at:
http://www.irtelectronics.com

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Type AG-738

Stereo Audio Phase / Failure Detector

Instruction Book

Table of Contents

This instruction book applies to units later than S/N 0502001.

Operational Safety:

WARNING

Operation of electronic equipment involves the use of voltages and currents that may be dangerous to human life. Note that under certain conditions dangerous potentials may exist in some circuits when power controls are in the **OFF** position. Maintenance personnel should observe all safety regulations.

Do not make any adjustments inside equipment with power **ON** unless proper precautions are observed. All internal adjustments should only be made by suitably qualified personnel. All operational adjustments are available externally without the need for removing covers or use of extender cards.

IRT Eurocard
Type AG-738
Stereo Audio Phase / Failure Detector

General Description

The AG-738 audio detector is designed to detect the presence of a stereo program signal and provide alarm outputs on failure of the left, right or both channels and of stereo phase reversal. Alternately the AG-738 can be used to monitor two mono audio circuits and provide individual alarm outputs on failure of an audio circuit.

The AG-738 will accept audio signals in the range -20 dBm to +20 dBm from a balanced or unbalanced source, presenting an input impedance of 10kΩ.

The detector circuitry consists of precision rectifier circuits driving comparators, which enable oscillators that trigger dual mono stable circuits that allow the response time of the alarm circuits to be set. The detection threshold of each channel is adjustable within the range -20 dBm to +20 dBm. The response time is set by means of DIP switches in the RC timing circuit and is adjustable from 5 to 160 seconds for the AUDIO FAIL time out and 5 to 40 seconds for the AUDIO PRESENT response time, the adjustment being made in 5 second steps.

The alarm circuitry consists of latching circuits triggered by the detector circuits. These drive two relays whose contacts are available at the rear panel of the AG-738. The alarm circuits can be reset automatically upon return of the audio signals or by a contact closure from the front panel or a remote circuit.

Visual indication of the state of the AG-738 detector and alarm circuits is provided by LED indicators on the front panel.

The AG-738 is built to the Eurocard format and will mount in all IRT standard frames.

Standard features:

- Individual left and right failure outputs.
- Stereo out of phase output.
- Adjustable threshold on each output.
- Adjustable fail and restore times
- Relay isolated outputs.
- Front panel indications.
- Remote, local or auto reset.

Technical Specifications
IRT Eurocard module
Type AG-738

Audio:

Inputs:

Type	Tranformerless, balanced bridging.
Impedance	> 10 kΩ
Max. Input Level	-20 dBm to +20 dBm.
Connectors	Plugable screw block connectors, and Krone IDC connectors.

Control:

Detection threshold	Internal preset adjustments in the range -20 dBm to +20 dBm.
Response time	5 - 160 seconds for AUDIO FAIL condition. 5 - 40 seconds for AUDIO PRESENT condition. Timing adjustable in 5 second steps using PCB mounted DIP switch assemblies.
Visual indicators	AUDIO FAIL ALARM PHASE AUDIO 1 PRESENT AUDIO 2 PRESENT POWER

Outputs:

Relay circuits operated from alarm logic.
Latching or auto-reset mode available.
Make or break relay contacts available.

Inputs:

When operated in the LATCHING ALARM MODE internal logic alarm circuits can be reset by a front panel RESET pushbutton or by external 12V to 48V to a opto-isolator circuit used to isolate the internal logic circuit.

Connector: Krone IDC connectors.

Power Requirements:

28 Vac CT (14-0-14) or ± 16V DC

Power consumption: 2.0 VA.

Other:

Temperature range		0 - 50° C ambient
Mechanical		Suitable for mounting in IRT 19" rack chassis with input, output and power connections on the rear panel
Finish:	Front panel	Grey background, black lettering & red IRT logo
	Rear assembly	Detachable silk-screened PCB with direct mount connectors to Eurocard and external signals
Dimensions		6 HP x 3 U x 220 mm IRT Eurocard
Supplied accessories		RB-738 rear connector assembly with matching connectors for inputs & outputs.
Optional accessories		Instruction manual TME-6 module extender card

Technical Description

The AG-738 circuitry consists of two input amplifiers, signal detectors, a phase detector, logic circuits, timing circuits and relay drivers for the control outputs of the detector.

Audio Detector Circuits.

Input 1 circuit consists of transformer coupled input T1 a 10 kΩ to 2 kΩ audio transformer with the input circuit built out by resistors R1 and R2 and C1 providing DC isolation between the two input wires. RV1 provides the secondary load for the transformer and is used to set the sensitivity of the detector circuit. The input signal is amplified by U1A and U1B wired as voltage amplifiers and rectified by the precision rectifier circuit U1C and U1D, The resultant DC voltage is applied to one input of U3B wired as a comparator circuit, the output signal from U3B being used to enable a astable oscillator circuit U7A, to enable NAND gate U7B which is used together with the output from the channel 2 oscillator U7C to indicate the presence of both channels and to turn on the AUDIO 1 PRESENT LED indicator circuit U10F and LD2.

Similarly input 2 circuit consists of T2, amplifiers U2D and U2C, precision rectifier circuit U2B and U2A with the resultant DC voltage being applied to comparator U4C whose output controls astable oscillator U7C and turns on the AUDIO 2 PRESENT LED indicator circuit U10E and LD3.

Phase Detector Circuit.

The phase detector circuit is designed to take advantage of the fact that most stereo signals do not have much channel separation below 1 kHz, however the program content of a stereo signal is similar only for short periods and thus the response delay of the AG-738 delay circuits should be shortened for phase detection. When the phase detector is used to check the phase between a monophonic signal transmitted on a stereo circuit this limitation does not exist.

The stereo phase indicator circuit consists of U3A and U4D two 800 Hz low pass filters connected to the outputs of the first audio amplifiers in the detector circuits of each channel. The outputs of the low pass filter circuits are connected to U4A a difference amplifier and U3D a summing amplifier to provide L-R and L+R signals, which are rectified by the D9 and D10 circuits. The DC voltages from the rectifiers are applied to the two inputs of U3C a operational amplifier acting as a comparator. The output of comparator U3C controls astable oscillator U7D and turns on the PHASE led indicator circuit U10G and LD4. The sensitivity of the phase detector circuit is set at some 6 dB less than the audio presence detector circuits and will indicate a IN PHASE condition when the signal is below the threshold of the D9, D10 detector circuits.

Delay Circuits.

The detector outputs all enable astable circuits which provide the clock inputs to monostable timing circuits U5 and U8 which are used to provide the delay timing for the alarm latch circuits U6 and U9. This enables the timing to be done in preset intervals and be adjusted by means of DIP switches simplifying the setting of the delay times.

For the channel one circuit links 3 and 4 are used to select the trigger signals to the delay circuit. U8A and U8B are retriggerable monostable circuits triggered in sequence by the pulses from the astable oscillator selected by the link setting. The logic levels from pins 6 and 9 of U8 are gated by AND gate U9A to determine if a signal is present and enabling the astable oscillator thus providing trigger pulses to U8A pin 4. U8A will time out when trigger signals cease the time being set by the RC network at pin 2. The time is set by adjusting the resistance using DIP switches SW9 to SW13 to short resistor sections. Switch 9 provides a 5 second step, switch 10 a 10 second step, switch 11 a 20 second step, switch 12 a 40 second step and switch 13 a 80 second step. In this way the timing of the delay before a failure is detected can be adjusted from a minimum of 5 second to a maximum of 160 seconds. The first trigger pulse will change the state at U8 pin 6 and trigger U8B for one timing period, this will delay the sensing of the signal present at U9 pin 3 and thus set the time before the alarm status signal changes. The time is set by adjusting the resistance in the timing network using DIP switches SW14, SW15 and SW16 to give 5, 10 and 20 second steps, thus the ON delay can be adjusted from 5 to 40 seconds in 5 second steps. U9A gates the two logic signals from U8, with U9B inverting the logic signal, its output being at ground potential with signal present.

Alarm Latch Circuits.

U9C and U9D are wired to form a BISTABLE latch triggered by negative signals at pins 9 and 13. If the outputs from U8 change state then a -12 Volt signal from U9/4 will cause U9/10 to change to ground level and U9/11 to -12 Volts and thus lock the latch in that state. The ground signal from U9/10 will turn on the relay driver circuit U10A and energise relay RL2. When the signal level is sufficient to trigger U8 then the change of state at U9/4 **with LINK 6 inserted** will reset the latch circuit and the relay will turn off.

Similarly the trigger signals from U7C the astable oscillator enabled by the second audio detector circuit or the gated oscillator signal from the stereo signal gate U7B as set by links 1 and 2 will trigger delay circuits U5A and U5B.

The timing of U5A and U5B circuits are set by RC circuits whose time is adjusted by changing the value of the resistance in predetermined steps as explained for U8 using DIP switches SW1 to SW8. U6A gates the logic outputs of U5, U6B inverts this signal to trigger the alarm latch U6C and U6D. The relay drive is provided by U10C and the AUTO RESET of the latch circuit with signal present and LINK 5 inserted is provided by U10B. A visual indication of a ALARM condition on either channel is provided by LD5 which will turn on via D15 or D16 if either RL1 or RL2 is energised.

Alarm Latch Reset.

The latch circuits can be used to give an indication of a past signal failure when LINKS 6 and 5 are NOT inserted. With **link 6 and 5 removed** the latch circuits will stay in the ALARM state until a reset is applied to the reset line, this reset can come from the front panel reset pushbutton switch or from the remote reset circuit U11. U11 a opto isolator circuit is used to isolate the remote circuit from the AG-738, its input circuit will respond to a voltage in the range 12 to 48 Volts between the input side of R89 and U11 pin 2. Links 11, 12 and 13 can change the input circuit to provide a ground, direct connection or a feed of the internal -12 Volts to the negative side of the opto isolator input. This will allow the reset to be performed by applying an external 12 to 48 Volt voltage either negative ground or fully floating, or by applying a isolated ground to R89 input and using the internal 12 Volts supply. Q1 is a power on reset circuit which applies a reset to U6D and U9D when the circuit power is switched on.

Power Supply.

The power supply circuit consists of a full wave rectifier circuit D1 to D4 and a three terminal rectifier circuit U12 to regulate the resultant voltage down to -12 volts.

Pre-installation:

Handling:

This equipment may contain or be connected to static sensitive devices and proper static free handling precautions should be observed.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Power:

AC mains supply: Ensure that operating voltage of unit and local supply voltage match and that correct rating fuse is installed for local supply.

DC supply: Ensure that the correct polarity is observed and that DC supply voltage is maintained within the operating range specified.

Earthing:

The earth path is dependent on the type of frame selected. In every case particular care should be taken to ensure that the frame is connected to earth for safety reasons. See frame manual for details.

Signal earth: For safety reasons a connection is made between signal earth and chassis earth. No attempt should be made to break this connection.

Audio input:	transformer balanced signal connection with Gnd shield pin marked on rear assembly.
Reset input:	opto isolated with option for connecting one side to -12 Vdc rail (current limited).
Control outputs:	relay isolated selectable make or break pair with no connection to ground.

Internal Adjustments

The AG-738 detector is factory aligned for correct operation in the stereo mode with the detector thresholds set for a -20 dBm input signal and the response times set for 5 second delay before a change in state occurs.

See *Configuration* for user adjustments.

Configuration

Relay output mode:

The relay contacts used can be the normally open or closed set this is set by selection of links 7, 8, 9 and 10.
Note that the relay is unenergised when operation is normal and energised during an alarm condition.

Links 7 and 9 IN the **normally closed** set

Links 8 and 10 IN the **normally open** set

Stereo or 2 channel mono mode:

The AG-738 can be operated as a stereo detector to check for the presence of both the left and right audio channels and correct phasing of the two channels, or as a dual independent mono audio detector.
Links 1 to 4 are used to set the AG-738 in the required mode.

LK 2 and 3 IN **stereo** operation

LK 1 and 4 IN **mono** operation

Alarm latch reset mode:

Links 5 and 6 are used to set the alarm latch reset mode.
To **enable** the alarm latch circuits leave **LK 5 and 6 out**,
this will ensure that if a failure occurs the relay contacts will register the fact until a manual or remote reset is applied.

Remote reset mode:

The remote reset can be initiated in different ways as set by links 11, 12 and 13.

Positive voltage:
To reset using a positive voltage in the range 12 to 48 Volts with the **negative grounded** insert links in positions LK 12 and LK 13. The reset voltage is applied to the control connector J 1 pins 2 and 3, with 2 being the ground and 3 being the positive control input.

Negative voltage:
To reset using an isolated or **positive grounded** voltage in the range 12 to 48 Volts insert a link in position LK 12. The reset voltage is applied to the control connector J 1 pins 2 and 3 with, 2 being the negative and 3 being the positive input.

Relay contact:
To reset using a grounding isolated relay contact the internal 12 Volts negative supply can be used, insert links in positions LK 11 and LK 13. The relay contact is applied between pins 2 and 3 of the control connector, with 2 connected to ground in the AG-738.

Detector threshold:

The detector thresholds are set by RV 1 and RV 2 and are factory adjusted for -20 dBm sensitivity.

These can be set by applying a 1 KHz audio signal at the required level to the input of the channel to be set and adjusting RV 1 for channel 1 and RV 2 for channel 2 sensitivity.
Adjust the potentiometer to just turn off the AUDIO ON LED indicator LD 2 or LD 3.
Note that LD 2 and LD 3 monitor the detector outputs and are thus an instantaneous indication of audio signal exceeding the threshold level, and during operation they will turn on and off indicating program activity.

Alarm timing:

Signal fail - Channel 1 / Phase:
As explained in the circuit description DIP switches SW 9 to SW 13 are used to set the time out response of the delay circuit at signal failure of channel 1 when used as a mono audio detector, or out of phase detection when used as a stereo audio detector as set by links 3 and 4.

SW 9 open = 5 seconds,
SW 10 open = 10 seconds,
SW 11 open = 20 seconds,
SW 12 open = 40 seconds &
SW 13 open = 80 seconds.

Set the response time by opening switches whose time will add up to give the response time required - 5 seconds (the minimum time).
It is recommended that the time be set to 60 seconds or more when used as an audio detector on channel 1 in the mono mode and at 10 seconds for a phase detector in the stereo mode and the alarm latch be used in the auto reset mode with link 6 IN for out of phase detection.

Signal restore - Channel 1 / Phase:
DIP switches SW 14 to SW 16 are used to set the channel 1 or phase detector response delay to the return of signal or correct phase.

SW 14 open = 5 seconds,
SW 15 open = 10 seconds &
SW 16 open = 20 seconds.

Set the response time by opening switches whose time will add up to the response time required - 5 seconds (the minimum time).

Signal fail - Channel 2 / Stereo:
DIP switches SW 1 to SW 5 are used to set the time out response of the delay circuit at signal failure of channel 2 when used as a mono audio detector, or either channel when used as a stereo detector as set by links 1 and 2.

SW 1 open = 5 seconds,
SW 2 open = 10 seconds,
SW 3 open = 20 seconds,
SW 4 open = 40 seconds &
SW 5 open = 80 seconds.

Set the response time by opening switches whose time will add up to give the response time required - 5 seconds (the minimum time). It is recommended that the time be set to 60 seconds or more.

Signal restore - Channel 2 / Stereo:
DIP switches SW 6 to SW 8 are used to set the channel 2 or stereo signal detector response delay to the return of signal.

SW 6 open = 5 seconds,
SW 7 open = 10 seconds &
SW 8 open = 20 seconds.

Set the response time by opening switches whose time will add up to the response time required - 5 seconds (the minimum time).

Installation

Installation in frame or chassis:

See details in separate manual for selected frame type.

Audio connections:

Audio input connections are made using either the three pin screw terminals or the Krone IDC connectors provided with the AG-738 rear assembly.

For mono operation it is usual to connect the input audio cable to the Left input pins. For stereo connect the Left input cable to the IN 1 input and the Right input audio cable to the IN 2 input.

Audio inputs are of high impedance so that the detector may be used in bridging situations. Where this is not the case, and a 600 Ω input termination is required, 620 Ω termination resistors should be fitted to the input sockets. (The 620 Ω in parallel with the 10 kΩ input impedance results in a 600 Ω input.)

Control connections:

Control and Alarm output connections are via two 4-pin Krone IDC connectors on the rear assembly.

SK4

4. RL 1 relay contact- (Stereo or CH 2 Fail)*
3. RL 1 relay common
2. RL 2 relay contact- (Phase or CH 1 Fail)*
1. RL 2 relay common

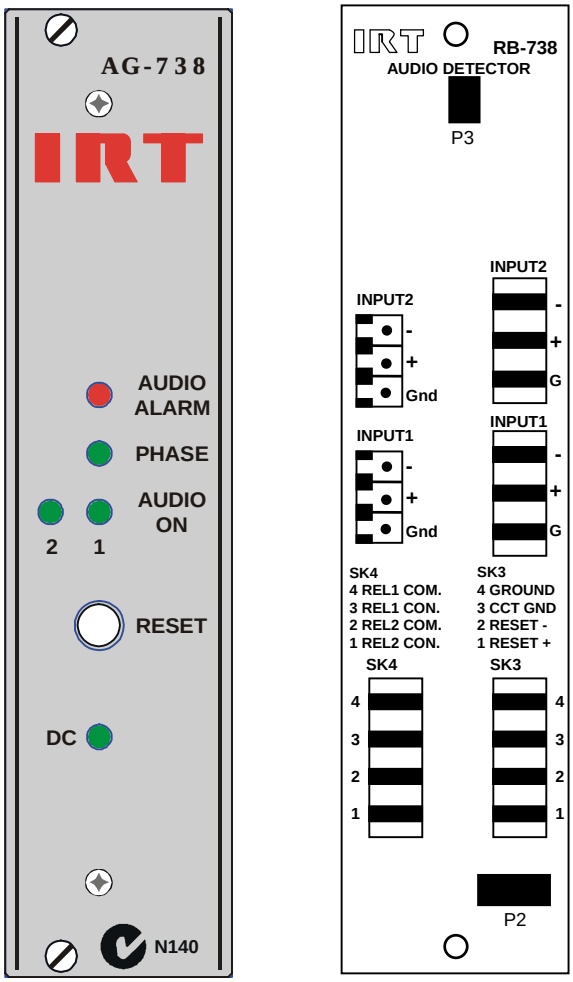
SK3

4. Ground
3. Cct Ground
2. Reset -
1. Reset +

* (Depends on LK 1 - 4 setting. See *Configuration* section for details.)

Front & rear panel connector diagrams

The following front panel and rear assembly drawings are not to scale and are intended to show relative positions of connectors, indicators and controls only.



Maintenance & Storage

Maintenance:

No regular maintenance is required.

Care however should be taken to ensure that all connectors are kept clean and free from contamination of any kind. This is especially important in fibre optic equipment where cleanliness of optical connections is critical to performance.

Storage:

If the equipment is not to be used for an extended period, it is recommended the whole unit be placed in a sealed plastic bag to prevent dust contamination. In areas of high humidity a suitably sized bag of silica gel should be included to deter corrosion.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Warranty & Service

Equipment is covered by a limited warranty period of three years from date of first delivery unless contrary conditions apply under a particular contract of supply. For situations when "**No Fault Found**" for repairs, a minimum charge of 1 hour's labour, at IRT's current labour charge rate, will apply, whether the equipment is within the warranty period or not.

Equipment warranty is limited to faults attributable to defects in original design or manufacture. Warranty on components shall be extended by IRT only to the extent obtainable from the component supplier.

Equipment return:

Before arranging service, ensure that the fault is in the unit to be serviced and not in associated equipment. If possible, confirm this by substitution.

Before returning equipment contact should be made with IRT or your local agent to determine whether the equipment can be serviced in the field or should be returned for repair.

The equipment should be properly packed for return observing antistatic procedures.

The following information should accompany the unit to be returned:

1. A fault report should be included indicating the nature of the fault
2. The operating conditions under which the fault initially occurred.
3. Any additional information, which may be of assistance in fault location and remedy.
4. A contact name and telephone and fax numbers.
5. Details of payment method for items not covered by warranty.
6. Full return address.
7. For situations when "**No Fault Found**" for repairs, a minimum charge of 1 hour's labour will apply, whether the equipment is within the warranty period or not. Contact IRT for current hourly rate.

Please note that all freight charges are the responsibility of the customer.

The equipment should be returned **to the agent who originally supplied the equipment** or, where this is not possible, to IRT direct as follows.

Equipment Service
IRT Electronics Pty Ltd
26 Hotham Parade
ARTARMON
N.S.W. 2064
AUSTRALIA

Phone: 61 2 9439 3744 Fax: 61 2 9439 7439
Email: service@irtelectronics.com

Drawing Index

Unless otherwise specified all references on diagrams to AG-638 refer equally to the AG-738.

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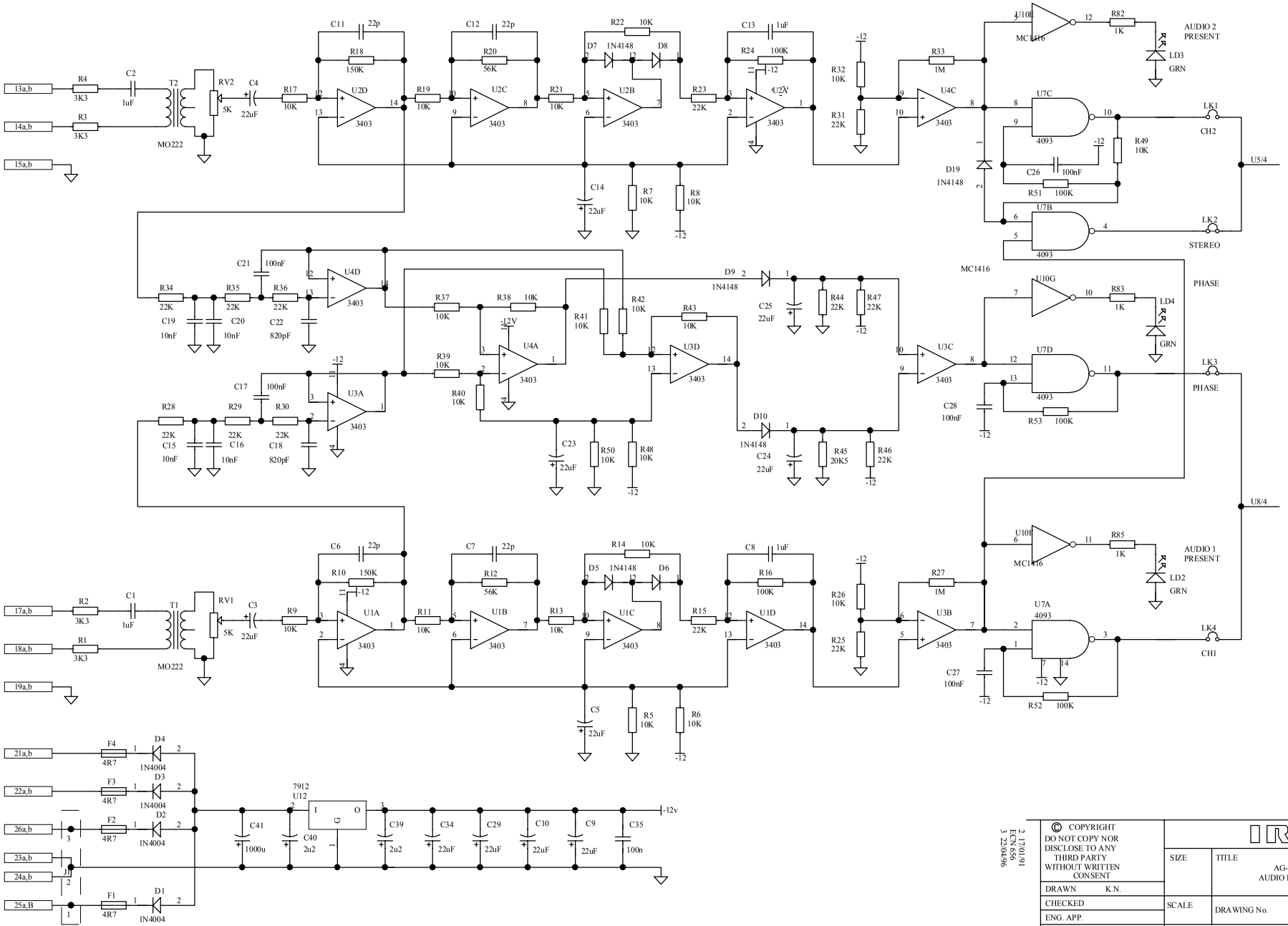
803132	1	AG-738 audio circuit schematic
803132	2	AG-738 logic circuit schematic
803135	1	RB-738 rear assembly circuit schematic


13a,b
14a,b
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R4 3K3
R3 3K3
C2 1uF
T2
MO222
RV2 5K
C4 22uF
R17 10K
C11 22p
R18 150K
U2D 3403
C12 22p
R20 56K
R19 10K
U2C 3403
R22 10K
D7 1N4148
D8
R21 10K
U2B 3403
C13 1uF
R24 100K
R23 22K
U2A 3403
R32 10K
R31 22K
R33 1M
U4C 3403
U10E MC1416
R82 1K
AUDIO 2 PRESENT
LD3 GRN
U7C 4093
LK1 CH2
R49 10K
C26 100nF
R51 100K
D19 1N4148
U7B 4093
LK2 STEREO
U5/4
C14 22uF
R7 10K
R8 10K
-12
MC1416
C21 100nF
R34 22K
R35 22K
R36 22K
C19 10nF
C20 10nF
C22 820pF
U4D 3403
R37 10K
R38 10K
-12V
U4A 3403
R41 10K
R42 10K
R43 10K
U3D 3403
R39 10K
R40 10K
D9 1N4148
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R47 22K
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U10G
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R29 22K
R30 22K
C15 10nF
C16 10nF
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C23 22uF
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C24 22uF
R45 20K5
R46 22K
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19a,b
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R1 3K3
C1 1uF
T1
MO222
RV1 5K
C3 22uF
R9 10K
C6 22p
R10 150K
U1A 3403
C7 22p
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U1B 3403
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D6
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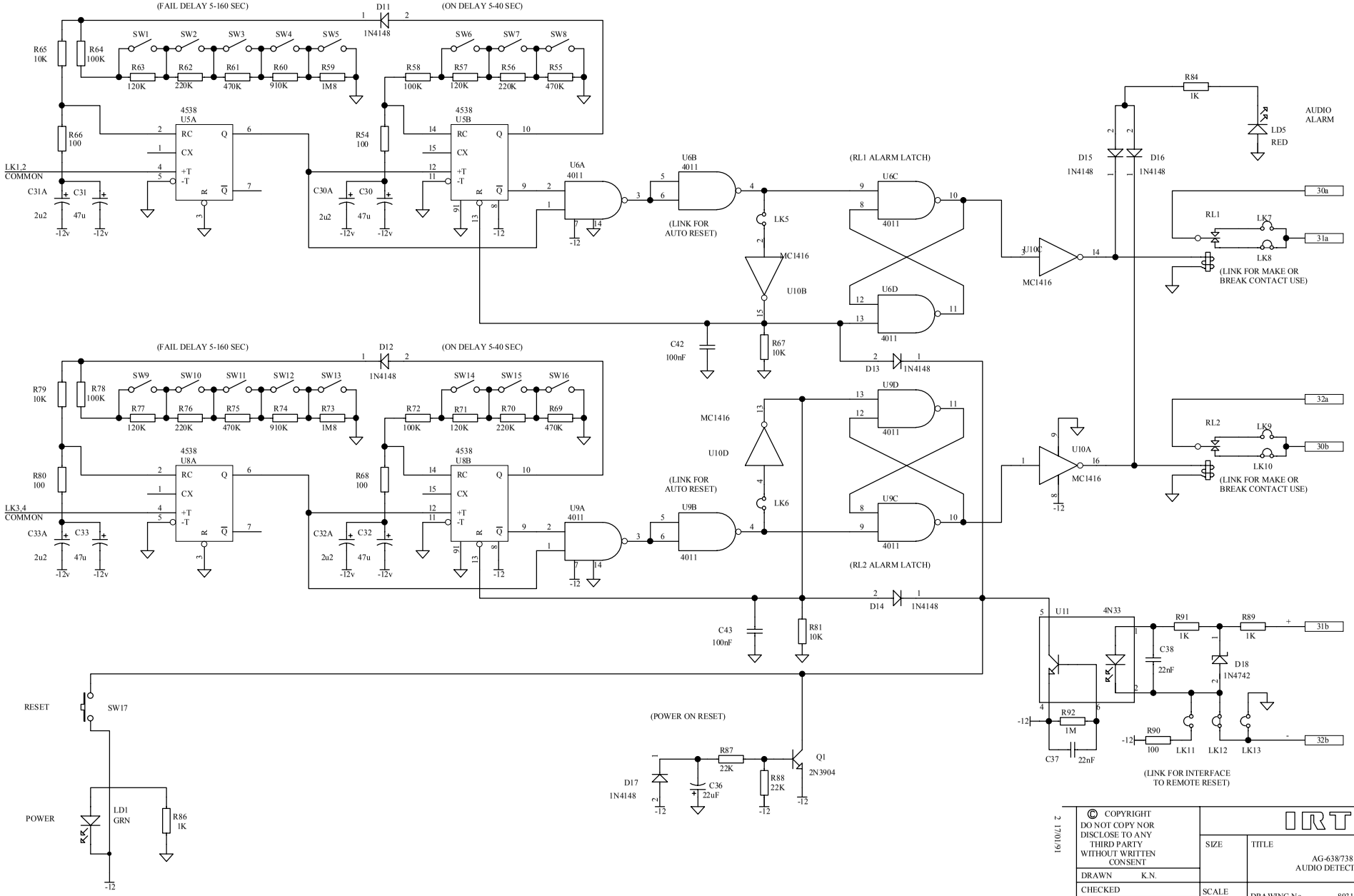

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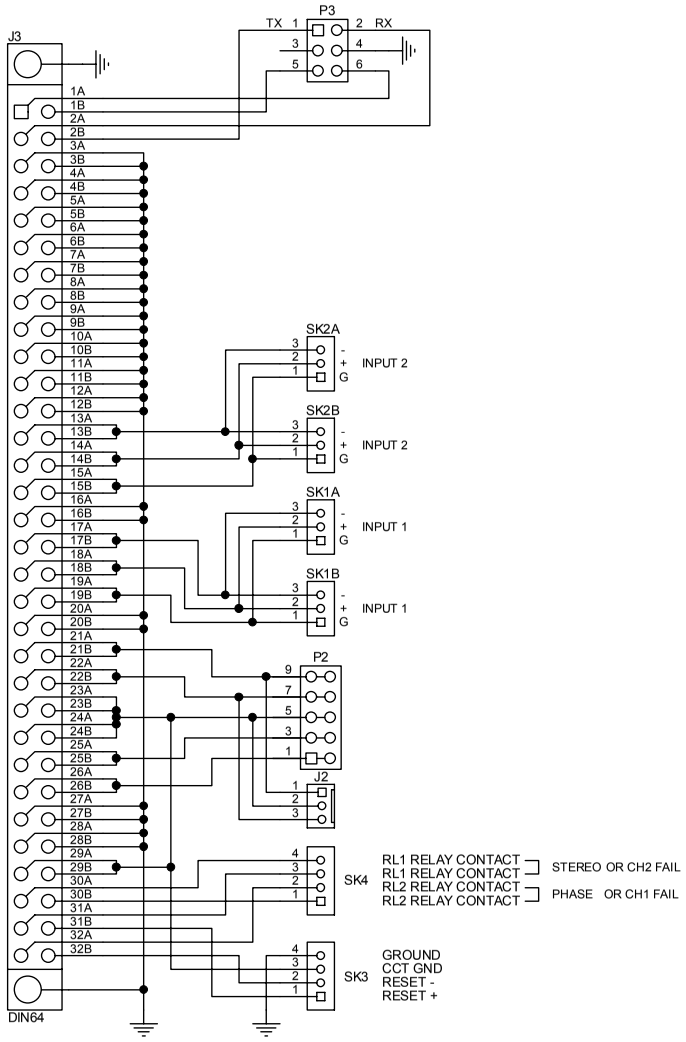

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AG-738 REAR ESSEMBLY

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Sheet 1 of 1

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