I.R.T. ELECTRONICS PTY LTD
26 Hotham Parade, ARTARMON, N.S.W. 2064 Australia
Phone: (ISD Code 61) (02) 439 3744 Fax: (02) 439 7439 Telex: AA122130

AA-289

10x1 AUDIO SWITCHER

8Ø2152

21-Ø8-1985

DESIGNED AND MANUFACTURED
IN AUSTRALIA

AA-289

1Øx1 AUDIO SWITCHER

INSTRUCTION BOOK

W A R N I N G

OPERATION OF ELECTRONIC EQUIPMENT INVOLVES THE USE OF VOLTAGES AND CURRENTS WHICH MAY BE DANGEROUS TO HUMAN LIFE. OPERATING PERSONNEL SHOULD OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE COMPONENTS OR MAKE ADJUSTMENTS INSIDE THE EQUIPMENT WITH POWER **ON** UNLESS PROPER PRECAUTIONS ARE OBSERVED. NOTE THAT UNDER CERTAIN CONDITIONS DANGEROUS POTENTIALS MAY EXIST IN SOME CIRCUITS EVEN THOUGH POWER CONTROLS ARE IN THE **OFF** POSITION.

GENERAL DESCRIPTION

The AA-289 Audio Switcher is a ten input Audio Switcher designed to operate as the AUDIO FOLLOW Switcher for an IRT Video Switcher. For Stereo Audio applications two AA-289 Switchers can be controlled from one Video Switcher by connecting the Tally control lines to each of the two AA-289 Switchers.

The AA-289 Audio Switcher can also be used as a STAND-ALONE Audio Switcher when it is controlled from a VA-291 Control Panel, again for Stereo applications two AA-289 Switchers can be controlled from one VA-291 Control Panel by connecting the control data lines of the VA-291 to each of the AA-289 Switchers.

Provision is made on the AA-289 and the VA-291 to link pairs of the units together and so implement a 20x1 Audio Switcher.

The input circuit of the AA-289 is designed to bridge across a balanced 600 ohm line. The output circuit will drive two 600 ohm balanced circuit loads, to a maximum level of +20 dBm.

An internal 240 Volt AC powered regulated Power Supply supplies the operating voltages for the AA-289 circuitry.

The AA-289 is housed in an IRT one rack unit (44mm high) 483mm (19 inch) rack mounting metal chassis. The Input and Output circuit connections are by means of compression screw terminal strips mounted on the edge of the main printed circuit board, accessible from the rear panel of the unit. Control input signals are connected via a pair of 25 pin "D" Connectors mounted on the rear panel, which are wired in parallel to allow the looping of the control signals to an extra AA-289 for Stereo applications.

TECHNICAL DATA

Inputs:	Ten 600 ohm balanced circuit, bridging (10 Kohms) input impedance
Outputs:	Two balanced 600 ohms
	Switched common Audio circuit for linking to another AA-289 when a 20x1 Switcher is implemented
Maximum Output Level:	+20 dBm
Frequency Response:	+/- 0.25 dB in the range 20Hz to 15KHz. (Referenced to 1KHz)
Harmonic Distortion:	Less than 0.2% in the range 20Hz to 15KHz at an Audio level of +16dBm.
Noise:	With input terminated by 600 ohms:- Less than -90dBm. (Bandwidth 20Hz to 15KHz)
Crosstalk:	Between inputs:- Less than 80dB at 15KHz. (Input of measured channel terminated)
Control inputs:	One of 10 grounding circuits. (Internal 4.7 Kohms pull-up resistors to +12 volts) OR 4 bit BCD (TTL Levels)
Power requirements:	240V AC 7VA
Dimensions:	44mm x 480mm x 230mm
Accesories available:	VA-291 Control Panel Instruction manual

CIRCUIT DESCRIPTION

The Audio Input signals are switched by Relays RL1 to RL1Ø to the input circuitry of feedback amplifiers composed of (U8,Q11 and Q12) and (U9,Q13 and Q14).the input to each amplifier is AC coupled to eliminate any DC off-set that may be present on the incoming Audio signal. Each amplifier has a gain of two to boost the signal level so that an overall gain of unity is achieved when the output signal is terminated by a 6ØØ ohm load.
The output circuitry is DC coupled through sourcing resistors R43 to R46 to set the output impedance of the amplifier.

A feature of the circuitry is the isolation between each side of the balanced Audio circuit, achieved by using non-inverting amplifier circuits. This gives equal loading on each side of the balanced Audio lines, and allows the AA-289 to be used to switch a Stereo pair of Unbalanced Audio Circuits. Since unbalanced Audio circuits normally have an input impedance greater than 1Ø Kohms the gain in the amplifiers is then not required and could be changed to unity by removing resistors R34 and R4Ø.

Note the links LK1 and LK2 which (when completed) allow the relay common Audio circuit to be looped via TB2 to another AA-289 when a 2Øx1 switcher system is implemented.

The Control circuit of the AA-289 is arranged so that the control signal can be either a single ground contact to one of ten inputs OR a 4 bit BCD (TTL level) signal. The one of ten grounding inputs makes the AA-289 directly compatible with the VA-141 Video Switcher TALLY circuit and thus can be used as an Audio Follow Switcher for the Video Switcher. A ground on one of the 1Ø control inputs is inverted by U2 or U3 and the resulting high logic level is passed through an OR gate U4 or U5 to switch on the appropriate relay driver transistor (Q1 to Q1Ø). Note the 1ØK ohm, 1uF RC network in the base circuit of each BC1Ø7 relay driver transistor, this interfaces the 5 volt logic to the base circuit of the transistor and also acts to give a faster TURN-OFF than TURN-ON switching action to the transistor . This means that when switching between Audio signals the original signal is released a few milliseconds before the next signal is switched through to the output.

The BCD input allows the AA-289 to be used as a STAND-ALONE Audio Switcher together with a VA-291 Control Panel. A VA-291 control panel is a 1Øx1 switch panel with its own encoder and tally circuitry, it requires power from the AA-289 switcher and outputs a 4 bit BCD (TTL level) signal to control the switching of a AA-289. Provision is made on a VA-291 to deselect a companion control panel when two panels are used together with two AA-289 switchers to implement a 2Øx1 Audio Switcher. A 4 bit BCD signal applied to the inputs of U1 will be decoded to a one of 1Ø signal to be passed through an OR gate U4 or U5 to switch on the appropriate relay driver transistor.

CIRCUIT DESCRIPTION

When the one of 1Ø grounding input circuitry is used to control the AA-289, pullup resistors RN3 apply a 1111 signal to inputs of U1 the decimal decoder overranging its circuit and no output will be selected by it. Note this feature is not available in the 4Ø28 decoder IC of some manufacturers care must be taken if replacement is ever necessary.

Similarly when the 4 bit BCD signal is used to control the AA-289, pullup resistors RN1 give logic low signals at the outputs of U2 and U3 and no output will be selected from the one of 1Ø control input circuits.

The power supply consists of two bridge rectifier circuits and three terminal integrated circuit regulators to provide +/- 15 volts to operate the audio amplifiers, +12 volts for the relays and +5 volts for the logic circuits.

INSTALLATION

The AA-289 is housed in a 483mm (19 inch) rack mounting chassis one rack unit (44mm) high.

Signal Connections are by means of compression screw terminal strips, which plug into sockets mounted on the rear of the printed circuit board and protruding through the rear panel of the chassis. The Input and Output connection sets consist of groups of three terminals vis. Active+; Active-; Ground. Input 1 to the left of the chassis looking at the rear.

Control Signal Connections are made to a pair of 25 pin 'D' sockets on the rear panel.

Note: The 25 pin connectors are wired in parallel to allow one to be used for control signal wiring from the control switcher or control panel and the other to loop control wiring to a second AA-289 when pairs of switchers are used as a Stereo Switcher. This eliminates the need for wiring different cable sets to the same plug.

The Connections are:

a) For interfacing to a VA-141A Video Swithcher

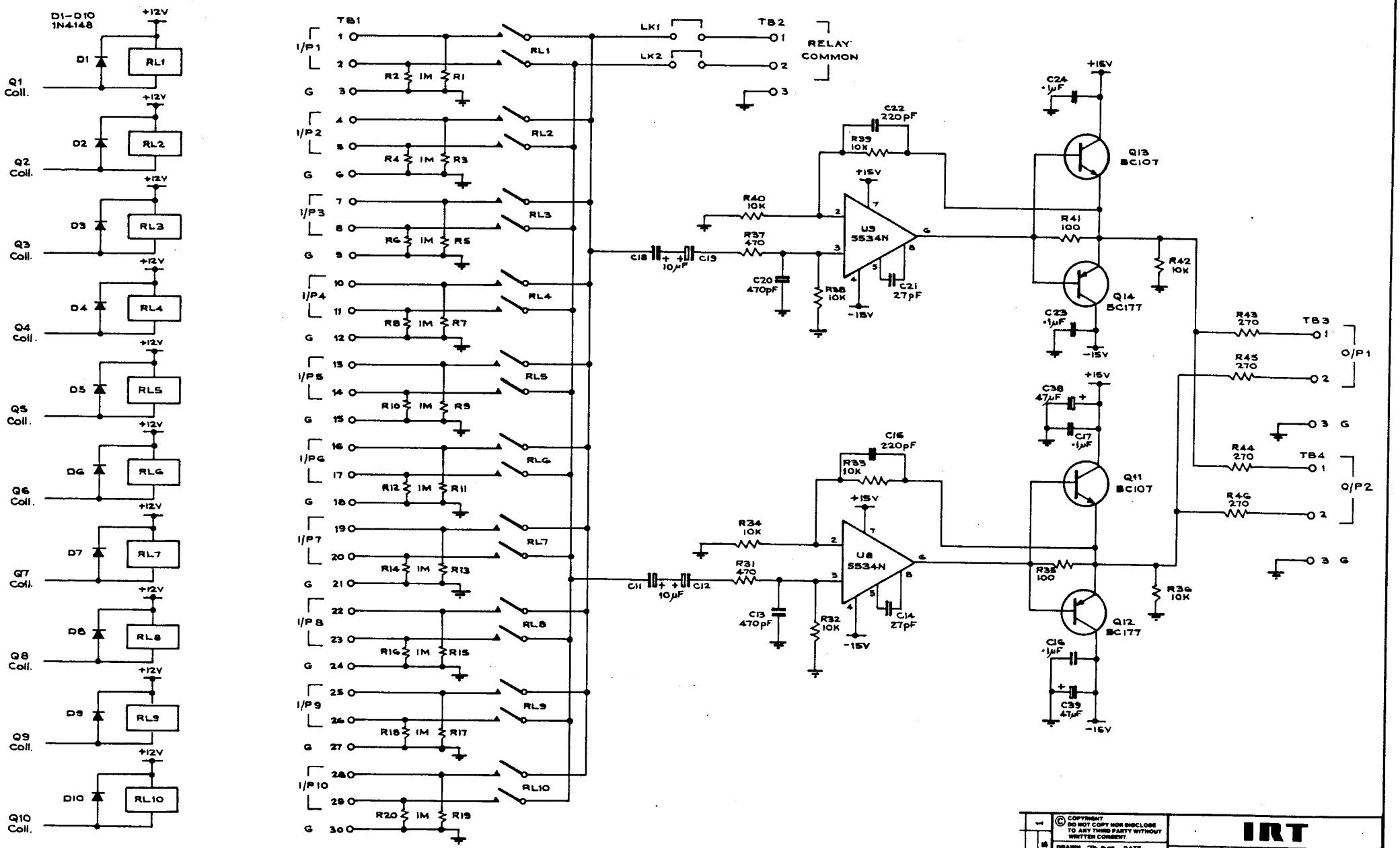
Pin 1	Input 1	Grounding control signal
" 2	" 2	" " "
" 3	" 3	" " "
" 4	" 4	" " "
" 5	" 5	" " "
" 6	" 6	" " "
" 7	" 7	" " "
" 8	" 8	" " "
" 9	" 9	" " "
" 1Ø	" 1Ø	" " "
" 17	GROUND	

b)For interfacing to a VA4ØØ/41Ø Video Switcher or VA-291 RCP

" 21	Bit A	BCD Input (TTL level)
" 2Ø	" B	" " "
" 19	" C	" " "
" 18	" D	" " "
" 17	GROUND	
" 14	+15 volt power for VA-291 Control Panel	

Note 1. when connecting two AA-289 and two VA-291 units together to make a 2Øx1 Audio Switcher complete links LK1 and LK2 on the AA-289 circuit board and wire the two switchers audio common circuits together by connections to terminal blocks TB-2.

Note 2. when looping the control signals from a VA-291 control panel to two AA-289 switchers for Stereo operation, only loop the control and ground wiring, between the AA-289 swithers. DO NOT loop the +15 volt line. The AA-289 switchers source the +15 volts to operate the VA-291 circuitry, thus only one AA-289 must have its +15 volt line connected to the VA-291 control panel.



DRAWN DATE
TRACED
CHECKED
ENG. APP.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM
FRACTIONS DECIMALS ANGLES

ORIGINAL ISSUE
DATE 8.6.88

IRT

TITLE
AA-289
10 x 1 AUDIO SWITCHER
AUDIO DIAGRAM

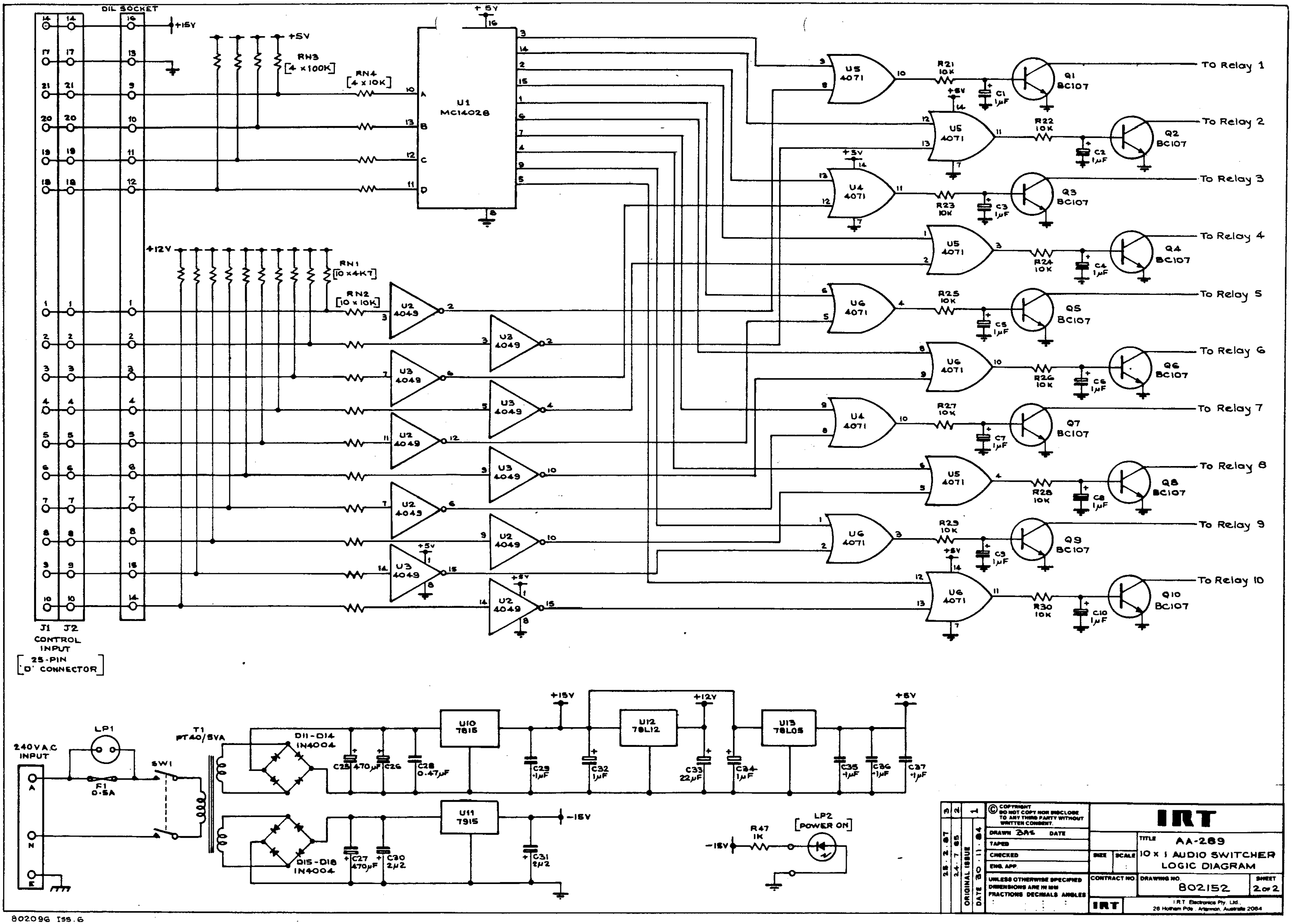
SIZE | SCALE

CONTRACT NO.

DRAWING NO.
802152

SHEET
1 of 2

IRT
I.R.T. Electronics Pty. Ltd.,
26 Hothern Pde., Artarmon, Australia 2064


DIL SOCKET
J1 J2
CONTROL INPUT
[25-PIN 'D' CONNECTOR]
+15V
+5V
+12V
-15V
RN3 [4 x 100K]
RN4 [4 x 10K]
RN1 [10 x 4K7]
RN2 [10 x 10K]
U1 MC14028
A B C D
U2 4049
U3 4049
U4 4071
U5 4071
U6 4071
R21 10K
R22 10K
R23 10K
R24 10K
R25 10K
R26 10K
R27 10K
R28 10K
R29 10K
R30 10K
C1 1μF
C2 1μF
C3 1μF
C4 1μF
C5 1μF
C6 1μF
C7 1μF
C8 1μF
C9 1μF
C10 1μF
Q1 BC107
Q2 BC107
Q3 BC107
Q4 BC107
Q5 BC107
Q6 BC107
Q7 BC107
Q8 BC107
Q9 BC107
Q10 BC107
To Relay 1
To Relay 2
To Relay 3
To Relay 4
To Relay 5
To Relay 6
To Relay 7
To Relay 8
To Relay 9
To Relay 10
240VA.C INPUT
A
N
E
LP1
F1 0.5A
SW1
T1 PT40/5VA
D11-D14 1N4004
D15-D18 1N4004
C25 470μF
C26
C28 0.47μF
C27 470μF
C30 2μ2
U10 7815
U11 7915
C29 ·1μF
C31 2μ2
C32 1μF
U12 78L12
C33 22μF
C34 1μF
U13 78L05
C35 ·1μF
C36 ·1μF
C37 ·1μF
R47 1K
LP2 [POWER ON]
ORIGINAL ISSUE
DATE 30 · 11 · 84
24 · 7 · 85
28 · 2 · 87
© COPYRIGHT DO NOT COPY NOR DISCLOSE TO ANY THIRD PARTY WITHOUT WRITTEN CONSENT.
DRAWN BAS
DATE
TAPED
CHECKED
ENG. APP
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM FRACTIONS DECIMALS ANGLES
IRT
TITLE AA-289
10 x 1 AUDIO SWITCHER LOGIC DIAGRAM
SIZE
SCALE
CONTRACT NO.
DRAWING NO. 802152
SHEET 2 OF 2
IRT Electronics Pty. Ltd., 26 Hotham Pde. Artarmon, Australia 2064

80209G ISS.6

I.R.T. ELECTRONICS PTY.LTD.

Replacement Parts List **802152 10x1 AUDIO SWITCHER AA-289 ISSUE 3**

Part No.	Description.	Qty	Cct Ref.	Sup
802535	PCB SUB-ASSEMBLY	1		1
PC802231	PCB CONNECTOR "D"	1		68
PC802233	PCB TRANSFORMER MOUNTING	1		68
DN25SY	SOCKET 25 PIN D [PCB]	2	J1,2	61
TB25	THREADED BLOCK	2pr	J1,2	35
L2728	FUSED APPLIANCE INLET (IEC320)	1	F1	20
20X5 .5A	20x5mm 500mA	2	F1	43
7201-P3	PUSHBUTTON LEVER DPDT	1	SW1	29
FR2840	TRANSFORMER POWER	1	T1	39
802154	FRONT PANEL AA-289	1		1
802155	REAR PANEL AA-289	1		1
802156	BASE PLATE AA-289	1		1
801333	SIDE PANEL 1R/U	2		1
801426B	MOUNTING BRACKETS	2		26
SNU/0520/17/4	"U" NUTS 6BA	29		70
801335	CHASSIS COVER	2		26
133G	LED GRN INCL HOUSING	1	LP2	29
R10131-220/1020	DIP CABLE ASSEMBLY AA-289	1	P1,2	99
25.610.0353	PLUG 3 PIN 8112/3	3	TB2,3	61
25.610.0653	PLUG 6 PIN 8112/6	5	TB1	61

I.R.T. ELECTRONICS PTY.LTD.

Replacement Parts List **802535 PCB SUB-ASSEMBLY AA-289 ISSUE 3**

Part No.	Description.	Qty	Cct Ref.	Sup
RMF255-100R	RESISTOR METAL FILM .25W 5%	2	R35,41	58
RMF255-270R	RESISTOR METAL FILM .25W 5%	4	R43,44,45,46	58
RMF255-470R	RESISTOR METAL FILM .25W 5%	2	R31,37	58
RMF255-1K	RESISTOR METAL FILM .25W 5%	1	R47	58
RMF255-4K7	RESISTOR METAL FILM .25W 5%	1	RN1	58
RMF255-10K	RESISTOR METAL FILM .25W 5%	28	R21-30,32,36,38,42,RN2,RN4	58
RSM255-100K	RESISTOR METAL FILM .25W 5%	4	RN3	58
RMF255-1Meg	RESISTOR METAL FILM .25W 5%	20	R1-20	49
RSM251-10K	RESISTOR METAL FILM .25W 1%	4	R33,34,39,40	49
109-4K7	RESISTOR NETWORK 9x4K7	1	RN1	29
CC27P	CAPACITOR CERAMIC 27pF	2	C14,21	43
CC220P	CAPACITOR CERAMIC 220pF	2	C15,22	43
CC470P	CAPACITOR CERAMIC 470pF	2	C13,20	43
CC100N	CAPACITOR CERAMIC 100nF	8	C16,17,23,24,29,35-37	92
CC470N	CAPACITOR CERAMIC 470nF	1	C28	92
RB4.7/63	CAPACITOR ELECTRO 4.7uF 63V	10	C1-10	81
RB10/25	CAPACITOR ELECTRO 10uF 25V	4	C11,12,18,19	81
RB47/25	CAPACITOR ELECTRO 47uF 25V	2	C38,39	81
RB470/35	CAPACITOR ELECTRO 470uF 35V	3	C25,26,27	81
TT1/35	CAPACITOR TAG TANT 1uF 35V	2	C32,34	67
TT2.2/35	CAPACITOR TAG TANT 2.2uF 35V	2	C30,31	67
TT22/16	CAPACITOR TAG TANT 22uF 16V	1	C33	67
1N4004	DIODE POWER 1A	8	D11-18	97
1N4148	DIODE 75V 100mA	10	D1-10	97
BC107	NPN GP AUDIO TRANSFORMER	12	Q1-11,13	81
BC177	PNP GP AUDIO TRANSFORMER	2	Q12,14	81
9050-09-01	TRANSISTER STANDOFF TO-18	14	Q1-14	43
NE5534	HIGH PERFORMANCE OP-AMP	2	U8,9	81

I.R.T. ELECTRONICS PTY.LTD.

Replacement Parts List **802535 PCB SUB-ASSEMBLY AA-289 ISSUE 3**

Part No.	Description.	Qty	Cct Ref.	Sup
78L05	IC REGULATOR 5V .1A	1	U13	97
78L12	IC REGULATOR 12V .1A	1	U12	97
7815	IC REGULATOR 15V 1A	1	U10	97
7915	IC REGULATOR -15V 1A	1	U11	97
6073 THM	HEAT SINK TO-220	1	U10	81
4028	IC DECIMAL DECODER	1	U1	97
4049	IC HEX INVERTER	2	U2,3	97
4071	IC QUAD 2 I/P OR	3	U4,5,6	97
W3108T	IC SOCKET 8 PIN	2	U8,9	99
W3114T	IC SOCKET 14 PIN	3	U4,5,6	99
W3116T	IC SOCKET 16 PIN	5	U1,2,3,S1,2	99
V23100W1112A104	RELAY 2C/O 9-14V	10	RL1-10	69
Z5.598.6353	SOCKET 3 PIN 8112/3	3	TB2,3	61
Z5.598.6653	SOCKET 6 PIN 8112/6	1	TB1	61
Z5.598.7253	SOCKET 12 PIN 8112/12	2	TB1	61
H2072Z01	PCB PINS	10		54
PC802096	PCB AA-289,AA-290	1		68