



MF-800

**Modular
2 x 1 Switching**



Statement of Warranty

The ISIS Group, Inc. warrants its products for a period of seven (7) years from the date of shipment to be free from defects in materials and workmanship and meets applicable published specifications. Equipment which has been operated within its ratings and has not been subjected to mechanical or other abuse or modification by the purchaser, its agents, and/or employees, will, at the option of The ISIS Group, be replaced or repaired if it is returned, freight prepaid, to ISIS. Equipment that fails under conditions other than described herein will be repaired at the price of components and labor in affect at the time of repair.

This warranty is in lieu of all other warranties, expressed or implied, with respect to the condition or performance of any ISIS Group product, its merchantability or fitness for a particular purpose. ISIS is not liable for any consequential damages.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Copyright

© 2005 The ISIS Group, INC.

Contents of this publication may not be reproduced in any form without the written permission of The ISIS Group. Reproduction or reverse engineering of copyrighted software is prohibited. The information in this manual is subject to change without notice or obligation.

January 2006

Part Number 71-0004

Installation and Operation Manual

CONTENTS

SECTION i	IMPORTANT SAFEGUARDS	Page i
SECTION I	GENERAL DESCRIPTION	Page 2
SECTION II	SPECIFICATIONS	Page 3
SECTION III	INSTALLATION	Page 6
SECTION IV	CIRCUIT DESCRIPTION	Page 7
SECTION VI	DIAGRAMS	Page 11

Important Safeguards and Notices

Information on the following pages provides important safety guidelines for both Operator and Service personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear here. Please read and follow the important safety information, noting especially those instructions related to risk of fire, electric shock or injury to persons.

WARNING



Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Symbols and Their Meaning in This Manual



The lightning flash with arrowhead symbol, within an equilateral triangle, alerts the user to the presence of “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle alerts the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



This symbol represents a protective grounding terminal. Such a terminal must be connected to earth ground prior to making any other connections to the equipment.



The fuse symbol indicates that the fuse referenced in text must be replaced with one having the ratings indicated.

Important Warnings and Cautions

Warnings

- Heed all warnings on the unit and in the operating instructions.
- Do not use this product in or near water.
- Disconnect ac power before installing any options.
- This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting the product inputs or outputs.
- Route power cords and other cables so that they are not likely to be damaged.
- Disconnect power before cleaning. Do not use liquid or aerosol cleaners; use only a damp cloth.
- Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.
- Do not wear hand jewelry or watches when troubleshooting high current circuits, such as the power supplies.
- During installation, do not use the door handles or front panels to lift the equipment as they may open abruptly and injure you.
- To avoid fire hazard, use only the specified correct type, voltage and current rating as referenced in the appropriate parts list for this product. Always refer fuse replacements to qualified service personnel.
- To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.
- Have qualified personnel perform safety checks after any completed service.

Warnings (continued)

- If equipped with redundant power, this unit has two power cords. To reduce the risk of electrical shock, disconnect both power supply cords before servicing.
- This equipment may employ laser(s). If it does, they comply with the current construction requirements of the code of Federal regulations, title 21, chapter I, subchapter J, sections 1010.2 and 1010.3 and sections 1040.10 and 1040.11.
- Do not attempt to view light output of the laser transmitter, eye damage may result. Always use an optical power meter to verify laser output.
- To prevent injury:
 - Never install telephone wiring during a lightning storm.
 - Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
 - Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
 - Use caution when installing or modifying telephone lines.

Cautions

- When installing this equipment, do not attach power cord to building surfaces.
- To prevent damage to equipment when replacing fuses, locate and correct the trouble that caused the fuse to blow before applying power.
- Verify that all power supply lights are off before removing power supply or servicing equipment.
- Use only specified replacement parts.
- Follow static precautions at all times when handling this equipment.

Cautions (continued)

- Leave the back of the frame clear for air exhaust cooling and to allow room for cabling. Slots and openings in the cabinet are provided for ventilation. Do not block them.
- Front door is part of fire enclosure and should be kept closed during normal operation.
- This product should be powered on as described in the manual. To prevent equipment damage select the proper line voltage at the ac input connector as described in the Installation documentation.
- To prevent damage to this equipment read the instructions in this document for proper input voltage range selection.
- To reduce the risk of electric shock, ensure that the two power supply cords are each plugged into a separate branch circuit.
- Circuit boards in this product are densely populated with surface mount and ASIC components. Special tools and techniques are required to safely and effectively troubleshoot and repair modules that use SMT or ASIC components. For this reason, service and repair of ISIS products incorporating surface mount technology are supported only on a module exchange basis. Customers should not attempt to troubleshoot or repair modules that contain SMT components. ISIS assumes no liability for damage caused by unauthorized repairs. This applies to both in- and out-of-warranty products.

North American Power Supply Cords

This equipment is supplied with molded grounding plug (NEMA 5-15P) at one end and molded grounding connector (IEC 320-C13) at the other end. Conductors are CEE color coded, light blue (neutral), brown (line) and green/yellow (ground).

Operation of this equipment at voltages exceeding 130 VAC will require power supply cords which comply with NEMA configurations.

International Power Supply Cord

This equipment is supplied with molded grounding connector (IEC 320-C13) at one end and stripped connectors (50/5 mm) at the other end.

Connectors are CEE color coded, light blue (neutral), brown (line) and green/yellow (ground).

Other IEC 320-C13 type power supply cords can be used if they comply with the safety regulations of the country in which they are installed.

Note:

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference, in which case the user will be required to correct the interference at his own expense.

SECTION I

MF-800

General Description

The MF-800 two-by-one switching system consists of a nine-cell rack frame with power supplies, plug-in modules, and control panels.

Either one or two power supplies may be installed. The second unit is for redundant operation and will operate automatically if the primary unit fails.

Several different 2x1 switching modules may be installed in the frame in any mix. If one power supply is included in the frame, then 8 different modules can be installed. If redundant supplies are installed, then the module quantity is limited to 7 modules. They are:

DV-800 - 2x1 Serial digital video.

DAS-21 - 2x1 Stereo audio (analog).

TW-422 - 2x1 RS422/485 data or AES/EBU serial audio.

PS-800 - Main power supply, (with remote control connector).

PS-801 - Redundant power supply, (without connector).

Control can be from the CP-800 local control panel mounted on the front door of the rack frame or by the CP-801 remote control panel.

A toggle switch on the front control panel allows the system to operate in either a "separate" or "all" mode. A third position marked "off" disables all operation from the control panel. When the switch is in the "separate" position, pushing any switch causes the module associated with that switch to toggle from one input to the other. Pushing the switch a second time will toggle that module to the other input. When the toggle switch is in the "all" position, pushing the #1 (leftmost) switch will cause all modules in the frame to switch together from one input to the other. NOTE: When in the "all" position, pushing any switch other than #1 will cause that particular module to momentarily switch to the other input as long as the button is held down. As soon as the pushbutton is released, the module will return to track the #1 (master) position.

SECTION II

DAS-21

Specifications

Inputs:

Number	2, Analog Left and Right, Stereo
Type	Differential, balanced or unbalanced
Impedance	>24k Ω balanced >12k Ω unbalanced
Level	+24dBu max., +8dBu nominal
Common Mode Rejection (CMRR)	>75dB, 20Hz to 20KHz

Outputs:

Type	Balanced around ground
Impedance	27.4 Ω each leg (54.8 Ω balanced)
Level	+24dBu max., +8dBu nominal
Gain	Unity, \pm 6dB by internal adjustment
Response	\pm 0.1dB, 20Hz to 20KHz @ 24dBu
Total Harmonic Distortion (THD)	<0.05% 20Hz to 20KHz @ 24dBu
Signal to noise ratio	>100dB ref. maximum output
Crosstalk	>-85dB
Tally current output	20mA max
Connectors	Barrier strip on 3.5mm centers
Power requirements	\pm 15vdc, 70mA max

SECTION II

TW-422

Specifications

Inputs:

Number	2 groups of 8
Type	Non-terminating

Outputs:

Number	1 group of 8
Type	Feedthrough from input selected
Relay mechanical life	>10 ⁸
Tally current output	20mA max.

Connectors	9 pin "D"
------------	-----------

Power requirements	+15vdc, 50mA max
--------------------	------------------

SECTION II

DV-800

Specifications

Inputs:

Number	2
Type	Terminating with 75Ω 0.1% in "OFF" position
Return loss	>15dB @ 1GHz

Output:

Type	Feedthrough, 75Ω
Response	DC - 1GHz.
Insertion loss	<0.5dB @ 1GHz
Isolation between inputs	>65dB @ 1GHz
Relay mechanical life	5×10^6
Tally current output	20mA max
Connectors	BNC, 75Ω
Power requirements	+15vdc, 50mA max

SECTION III

MF-800

Installation

The MF-800 2x1 switching system is designed to be mounted in a standard 19" equipment rack. There are no special cooling requirements though care should be taken to ensure that extremely hot equipment not be installed directly beneath the unit.

CAUTION: The method of mounting the BNC connectors on the DV-800 module is somewhat delicate. Excess cable stress may cause the connectors to break off of the PC board. It is strongly recommended that all external coax cables be supported so that there is no weight stress on the BNC connectors.

If both a primary and a redundant power supply are installed at the factory they have been placed at opposite ends of the frame. This makes it simple to connect their respective power cords to separate power feeds. Note that the two power supplies are not interchangeable. The primary supply must be located at the extreme right end of the frame, as viewed from the rear. The redundant supply may be plugged into any of the other positions.

In order for the master or "all" function to operate properly, it is necessary that a working module be operated in the #1 module cell position.

If the CP-801 remote control panel is used, it will require a 25-conductor cable terminated at both ends with 25-pin male "D" connectors. Maximum length of the control cable should not exceed 300ft.

On the rear of the control panel, at the end adjacent to the #8 push-button, is an 8-position DIP switch labeled 1-8. This switch enables +5v to each push-button LED. If any cell does not contain a module the switch corresponding to the cell position should be turned to the "OFF" position. If the redundant power supply has been installed in the #8 position, the #8 LED should definitely be turned off.

SECTION IV

MF-800

Circuit description

- 1. PS-800 Power Supply
- 2. CP-800 and CP-801 control panels
- 3. DV-800 digital video switcher
- 4. TW-422 RS422/RS485, AES/EBU switcher
- 5. DAS-21 Stereo audio switcher

1. Power supply. Refer to drawing 75-2104.

117vac 60Hz. is applied, via F1, to T1, a split primary, dual secondary, 24VA power transformer. The current from the secondary windings is rectified by BR1, a full-wave bridge connected as two full-wave rectifiers, and smoothed by C1 and C2. The positive output of the bridge is fed to U1 while the negative output goes to U2. These two voltage regulators are three terminal, monolithic, 500mA, (M series) or 1.5Amp, 15volt regulators with built-in thermal and over-current protection.

D1 and D2 are reverse-biased clamp diodes to ensure that neither 15v regulator output can go more than 0.6volts in the wrong direction upon power-up. Without these diodes it is possible for one regulator to swing the opposite rail too far at the wrong polarity so that the second regulator thinks it is looking onto a short circuit. When this happens the regulator will current-limit, fold back, and lock-up until the power is turned off and on again, at which time it may, or may not, operate. The diodes prevent this from happening.

The power supply circuit board is designed to have components installed to provide three separate output configurations. They are:-

- +15vdc and -15vdc @ 450mA
- +15vdc @ 1Amp
- -15vdc @ 1Amp

The remote control 25-pin "D" connector at the rear of the power supply module feeds control signals to the frame mother board via the 48-pin "DIN" connector on the front. This connector also provides the voltages for the plug-in modules.

2. CP-800 and CP-801 Local and Remote control panels and logic.

Refer to drawing 75-2101.

The 8 pushbuttons each have two LEDs, one green and one red. Switch function is a simple toggle each time a push-button is depressed so that each LED lights in turn.

SW-1 is a DPDT toggle switch with a center-off position. It provides a ground path for the pushbuttons. In the center "OFF" position the ground path is broken and the pushbuttons are inhibited.

With the switch in the "SEP" position, ground is available through pin 3. When any button is pushed a ground appears at its respective pin, e.g. if button 1 is pressed pin 25 of the "D" connector goes to ground. This toggles the latch on the module so that pin 12 changes state. IC3:D is 1/4 of a quad 2-input NAND gate connected as an inverter. If pin 12 is low the green LED is lit, pins 13 and 12 of IC3:D are low, pin 11 is high and the red LED is off. If pin 12 is high the green LED is off, pins 13 and 12 of IC3:D are high, pin 11 is low, and the red LED is on.

With SW-1 in the "ALL" position, ground is provided to all pushbuttons via pin 1. Also, all push-button outputs are connected through D1-D8 to the collector of Q1 via SW-1 pin 6. IC2 is an 8-input NAND gate with its inputs connected to the control pins of each push-button. Its output at pin 8 is normally low with all of its inputs held high by RN1 and RN2. When any push-button is pressed the output of IC2 goes high which is coupled via R3 and C5 to the base of Q1. This saturates the collector of Q1 pulling it to ground and thus grounding pins 14-17 and 22-25 of the "D" connector. This in turn forces all modules to toggle.

Current for the red and green LED lamps is provided by the "LED ENABLE" switch, SW-2 from RN3 and RN4.

If a module corresponding to any push-button is not installed in the MF-800 frame the switch at that position should be turned to the "OFF" position.

3. DV-800 2x1 Digital video switcher.

Refer to drawing 75-2107.

+15vdc, via R3 is fed to U1, a +5vdc three terminal, 100mA regulator. U1 provides +5vdc to IC1:A, half of a dual 74HC73 J-K flip-flop. This IC is connected so that a ground applied at its clock input at pin 1, via the card edge connector at pin E, causes it to change state, or "toggle". The output at pin 5 of the edge connector is fed back to the remote control panel to light the

green or red LED. R5/pin B lights the green LED on the front door of the frame while R4/pin 2 lights the red LED.

The Q output of IC1:A is fed via R2 to the base of Q1. When the #2 input is selected the red LED is illuminated, the Q output of IC1:A is high, and Q1 is saturated, turning on RLY-1, a 75 Ω , 1GHz. RF relay. This feeds video input 2 to the output.

4. TW-422, 2x1 RS422/RS485 data or AES/EBU digital audio switcher.

Refer to drawing 75-2103.

+15vdc, via R3 is fed to U1, a +5vdc three terminal, 100mA regulator. U1 provides +5vdc to IC1:A, half of a dual 74HC73 J-K flip-flop. This IC is connected so that a ground applied at its clock input at pin 1, via the card edge connector at pin E, causes it to change state, or "toggle". The output at pin 5 of the edge connector is fed back to the remote control panel to light the green or red LED. R5/pin B lights the green LED on the front door of the frame while R4/pin 2 lights the red LED.

The Q output of IC1:A is fed via R2 to the base of Q1. When the #2 input is selected the red LED is illuminated, the Q output of IC1:A is high, and Q1 is saturated, turning on relays K1 and K2. This connects J2 to the output connector, J3.

5. DAS-21 stereo audio switcher.

Refer to drawing 75-2105.

+15vdc, via R25 is fed to U3, a +5vdc three terminal, 100mA regulator. U3 provides +5vdc to IC10:A, half of a dual 74HC73 J-K flip-flop. -15vdc, via R26 is fed to U2, a -8vdc three terminal, 100mA regulator and +15vdc, via R25 is fed to U1, a +8vdc three terminal, 100mA regulator. The outputs of these two regulators provide the operating voltages for IC5, a dual 4-input CMOS multiplexer.

IC10:A is connected so that a ground applied at its clock input at pin 1, via the card edge connector at pin E, causes it to change state, or "toggle". The output at pin 5 of the edge connector is fed back to the remote control panel to light the green or red LED. R5/pin B lights the green LED on the front door of the frame while R4/pin 2 lights the red LED.

The Q output of IC1:A is fed to the "A" control input pin of IC5 which causes this IC to switch between inputs 1 and 2.

The four balanced audio inputs from the barrier strip on the rear of the module are fed to four identical ICs, IC1-4. These are SSM2143 balanced line receivers with a gain of -6dB. The output signals are AC coupled via C1-4 to the inputs of IC5. Each selected input is fed to its respective output by the toggle action of IC10:A corresponding to the control panel selection.

The two output stages are identical. IC6 and IC7 are inverting variable gain amplifiers with a range of ± 6 dB via VR1 and VR2. IC8 and IC9 are dual op-amps, one side connected as a non-inverting unity-gain voltage amplifier and the other as an inverting unity-gain amplifier. The outputs from each pair are therefore of opposite phase and equal amplitude forming a balanced output amplifier.

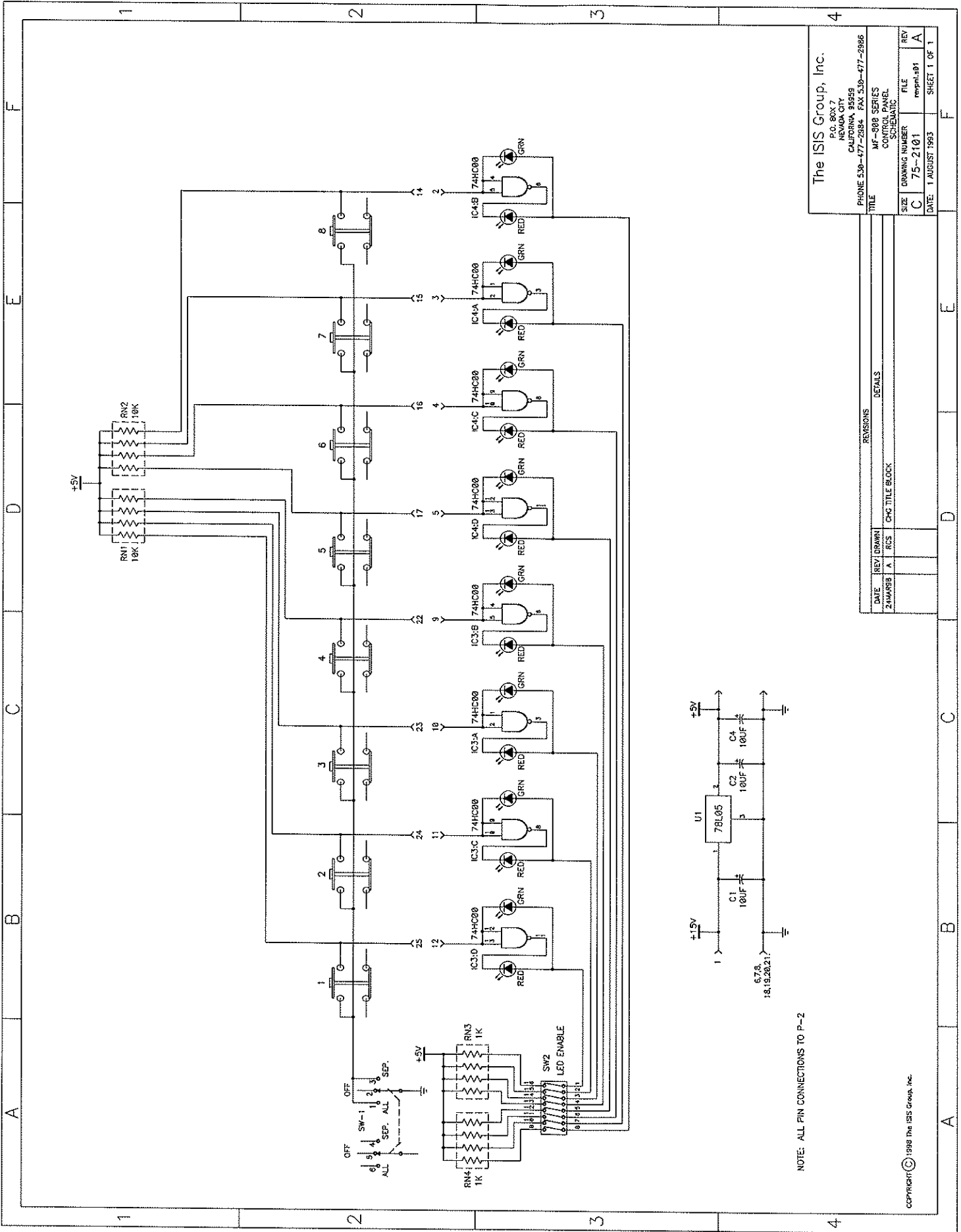
SECTION VI

MF-800

Diagrams

25-pin "D" Remote control connector pin assignments

75-2105	DAS-21 2x1 Stereo Audio schematic
75-2103	TW-422 2x1 RS422/AES/EBU schematic
75-2107	DV-800 2x1 Digital Video schematic
75-2101	CP-801 Remote Control Panel
75-2104	PS-800 Main Power Supply schematic
75-2108	PS-801 Redundant Power Supply schematic
75-8002	Mother board schematic



The ISIS Group, Inc.
 P.O. BOX 7
 NEVADA CITY
 CALIFORNIA 95959
 PHONE 530-477-2884 FAX 530-477-2986

TITLE		MF-800 SERIES CONTROL PANEL SCHEMATIC	
DATE	REV/ DRAWN	SIZE	FILE
24MAR88	A RJS	C	75-2101
REVISIONS		DRAWING NUMBER	REV
DETAILS		75-2101	A
CHG TITLE BLOCK		DATE:	SHEET 1 OF 1
		1 AUGUST 1983	

MF-800

25 pin "D" Connector

Pin assignments

"D"	"DIN"	Function
1.....	2a,b,c.....	+15vdc
2.....	14b,c.....	cell 8 tally
3.....	13b,c.....	cell 7 tally
4.....	12b,c.....	cell 6 tally
5.....	11b,c.....	cell 5 tally
6.....	GND.....	GND
7.....	GND.....	GND
8.....	GND.....	GND
9.....	6b,c.....	cell 4 tally
10.....	5b,c.....	cell 3 tally
11.....	4b,c.....	cell 2 tally
12.....	3b,c.....	cell 1 tally
13.....	15a,b,c.....	-15vdc
14.....	14a.....	cell 8 control
15.....	13a.....	cell 7 control
16.....	12a.....	cell 6 control
17.....	11a.....	cell 5 control
18.....	GND.....	GND
19.....	GND.....	GND
20.....	GND.....	GND
21.....	GND.....	GND
22.....	6a.....	cell 4 control
23.....	5a.....	cell 3 control
24.....	4a.....	cell 2 control
25.....	3a.....	cell 1 control