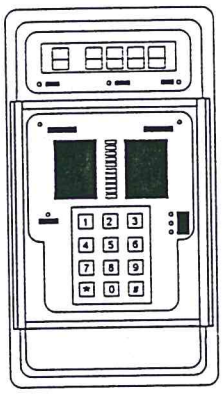
MULTI-SCAN IV CONTROLLER

MSC9400



INSTALLATION MANUAL

impro
TECHNOLOGIES (PTY) Ltd

Ref: MSCIM04.PM5
Issue: 4
Date: 30 May 1995

IMPORTANT NOTICE

Although all efforts have been made to make this manual as accurate as possible, Impro Technologies (Pty) Ltd does NOT accept any liability for errors or omissions. The data contained in this manual supersedes any other information published on the Multi-Scan IV Single Channel Terminal. We further reserve the right to amend/improve the equipment and manual without notice.

GUARANTEE / WARRANTY

Impro Technologies (Pty) Ltd warrants that the Products furnished under this agreement will be free from material defects in material and workmanship for a period of one year from the date of shipment. The Customer shall provide notice to Impro Technologies (Pty) Ltd of each such defect within one week after the Customer's discovery of such defect. The sole obligation and liability of Impro Technologies (Pty) Ltd under this warranty shall be to repair or replace as its option, without cost to the Customer, the product or part which is so defective and as to which such notice is given.

Upon request by Impro Technologies (Pty) Ltd, the product or part claimed to be defective shall immediately be returned at the Customer's expense to Impro Technologies (Pty) Ltd. Replaced or repaired products or parts will be shipped to the Customer at the expense of Impro Technologies (Pty) Ltd.

There shall be no warranty or liability for any products or parts which have been subject to misuse, accident, negligence, failure of electric power or modification by the Customer without Impro Technologies (Pty) Ltd written approval. Final determination of warranty eligibility shall be made by Impro Technologies (Pty) Ltd. If a warranty claim is considered invalid for any reason, the Customer will be charged for services performed and expenses incurred by Impro Technologies (Pty) Ltd in handling and shipping the returned item.

As to replacement parts supplied or repairs made during the original warranty period, the warranty period of the replacement or repaired part shall terminate with the termination of the warranty period with respect to the original product or part.

As Impro Technologies (Pty) Ltd has no control over where the product is used, or how it is installed, no liability for ANY consequential damages can be accepted, whether due to malfunction, design, deficiency, implementation or any cause whatsoever.

THE FOREGOING WARRANTY CONSTITUTES IMPRO TECHNOLOGIES (PTY) LTD SOLE LIABILITY AND THE CUSTOMER'S SOLE REMEDY WITH RESPECT TO THE PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES, LIABILITIES AND REMEDIES EXCEPT AS THUS PROVIDED, IMPRO TECHNOLOGIES (PTY) LTD DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDED ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Multi-Scan IV Single Channel Terminal is designed and manufactured by:

Impro Technologies (PTY) Ltd
P.O. Box 15407
Westmead
3608
Republic of South Africa

Phone: (031) 7001087
Fax: (031) 7001511
Phone:(INTL):(27)317001087
Fax: (INTL):(27)317001511

CONTENTS

Introduction

The Multi-Scan IV Controller is a stand-alone, manually programmable access controller, able to control up to 4 doors individually configured. Each door requires an access terminal to operate. Two types of terminals are available:

- Single Channel Terminal
- Dual Channel Terminal

The Multi-Scan IV Single Channel and Dual Channel Terminals are proximity access terminals designed for use with the Multi-Scan IV Controller.

A Multi-Scan IV system may have up to 4 terminals connected to it. These may be any combination of Single Channel or Dual Channel terminals. Thus a single Multi-Scan IV system can fully control up to 4 doors, anti-passback or non-anti-passback. A system with 4 anti-passback doors will require 4 Dual Channel Terminals, as well as 4 Remote Readers.

The Multi-Scan IV Dual Channel Terminal has been designed to implement anti-passback control of a portal in a Multi-Scan IV system. It works in conjunction with an Impro Remote Reader. Various types of Remote Readers are available, including vandal resistant scanners.

The Multi-Scan IV Single Channel Terminal may be used for portals where anti-passback control is not required.

Although the Single Channel Terminal is capable of reading only one proximity channel and cannot distinguish in and out access, it also has provision for a Remote Reader, to be connected in parallel with the on board reader. This facilitates the use of a vandal resistant Remote Reader, with the Single Channel Terminal as well.

Each Multi-Scan IV Controller is capable of controlling one anti-passback zone, with up to 4 doors into/out of the zone.

The Multi-Scan IV controller communicates with the Multi-Scan IV Terminals using a two wire RS485 bus. The terminals are multi-dropped off this bus, making the wiring of the system very convenient, cost effective and simple. Besides two communication wires, each terminal requires two power wires as well.

The communication between the Multi-Scan IV Controller and the terminals is at 19 200 Baud. (Revision 2.00 or later firmware).

The Multi-Scan IV terminals support:

- Anti-tamper switches.
- Door open sensors.
- Pushbuttons overrides.
- Reader disable inputs (for vehicle loop detectors, *etc*).
- Buzzer
- 3 LED indicators.
- Barcode readers (option).

The on board proximity readers in the terminals are capable of reading a proximity tag through most building materials, except metal. This makes installation of a system very easy, and in most cases, the units can be mounted on the 'secure side'. Where this is not possible, a Remote Reader should be used.

The Multi-Scan IV controller has been designed for wall mounting, and should always be mounted in a convenient and secure place. It uses Passwords and Master Tags to enhance the security of information.

The Multi-Scan IV Controller has a small on board proximity reader, to be used for programming the tags into the system. A barcode reader may also be connected to a Multi-Scan IV Controller for the purpose of setting up barcode tags.

The Multi-Scan IV Controller features an Alarm Relay, and a Power Control Relay. The Alarm Relay is intended for connection to some type of sound emitting device *e.g.* siren. The power control relay is normally used to initiate the switching of power to lighting and/ or air-conditioning systems, to maximize energy saving, as the output is OFF when there is no one else left in the area.

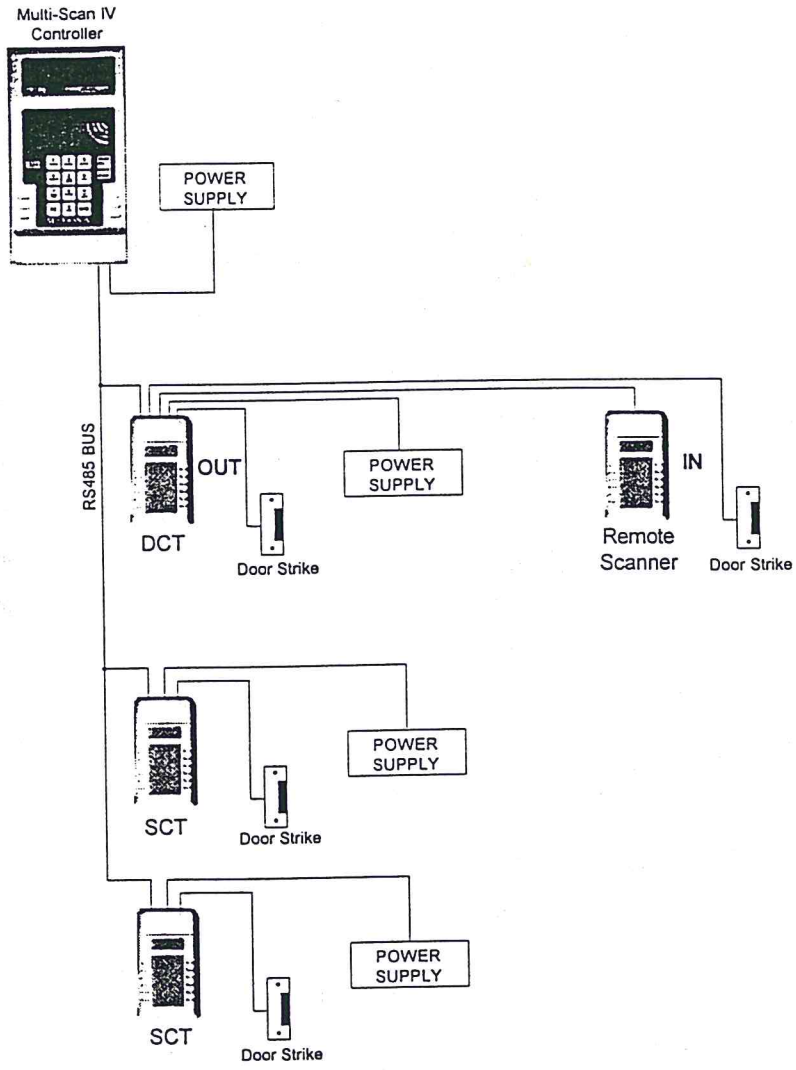
The Multi-Scan IV features a RS232 serial port for connection to a host PC, or a serial printer.

Specifications

Processor:	16 MHz 8 051 CPU with real time clock and battery backup.
Real Time Clock:	Deviation: ± 1 minute maximum per month @ 25 °C(+77 °F).
Power Requirements:	Internally fused 12 - 16 V DC or 10 - 14 V AC @ 500 mA maximum.
Fused outputs:	4 power outputs (for terminals) with common 5 A fuse (rated according to your load and power supply).
Size: (Approx.)	L = 220 mm (8,7"), B = 120 mm (4,7"), H = 50 mm (2")
Alarm Inputs:	2 x Dry contact inputs, protected to ±80 V
Relay outputs:	2 x Integrated SPDT 30 V DC / 250 V AC @ 1,5 A
RS 485 Port:	Link between Multi-Scan IV controller and Multi-Scan IV terminals @ 19 200 baud, 8 bit, no parity and 1 stop bit. See note on page 14 regarding baud rate.
RS 232 Port:	RS232 connection either to Computer or Serial Printer @ 9 600 baud, 8 bit, no parity and 1 stop bit.
Scan Channel:	Single channel for database editing.
Barcode Channel:	Single channel for barcode editing.
Display:	5 digit seven segment LED display plus 20 x LED s for programming purposes and status.
Keyboard:	3 x 4 tactile keyboard with dual functions. For programming purposes.
Reading distance:	The distance between the passive tag and reader is approximately 40 mm (1.6") from the coil (in front of the cabinet) but depends on the type of tag used. Card / ID type tags read slightly further than the button type.
Environmental:	Temperature range: -10 °C (+14 °F) to +70 °C (+158 °F). Humidity range: 0-95% non condensing.
Positioning:	The unit may be mounted on any material even metal with no effect on performance. Screw holes are provided in reader base.
Coil frequency:	281 250 Hz or 125 000 Hz.
Anti-tamper switch:	Integrated into cabinet and connected to CPU board.
Buzzer:	Piezo electric buzzer.

System Configuration

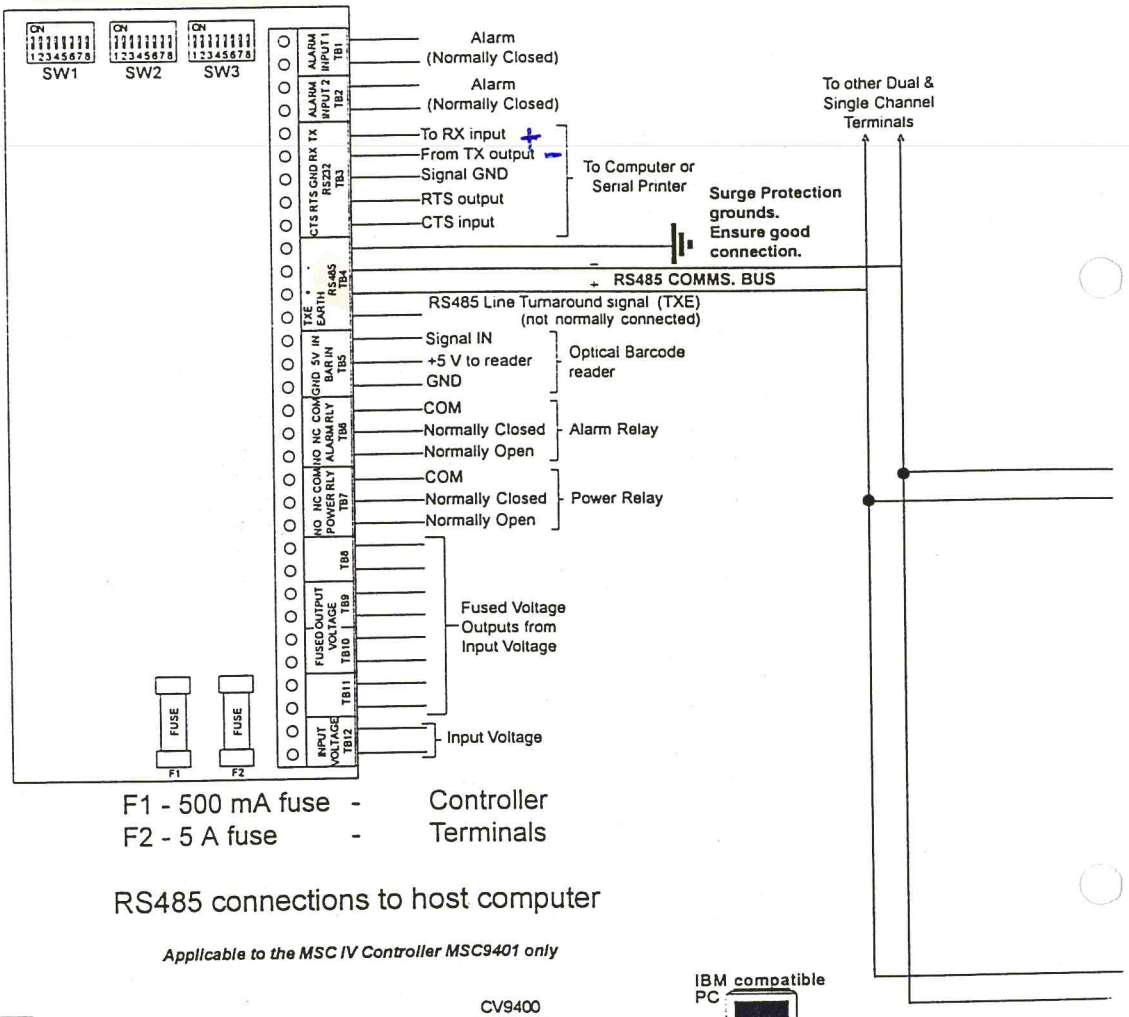
(example: 1 APB door plus 2 normal doors)



DCT = Dual Channel Terminal
SCT = Single Channel Terminal
APB = Anti-Passback

Terminal Block wiring diagram

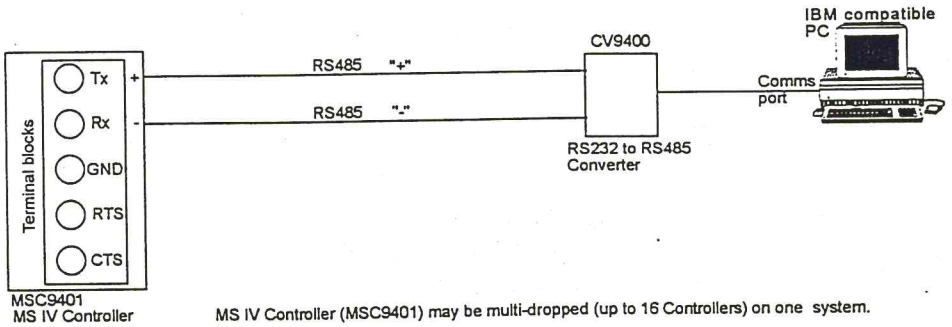
Multi-Scan IV Controller



F1 - 500 mA fuse - Controller
F2 - 5 A fuse - Terminals

RS485 connections to host computer

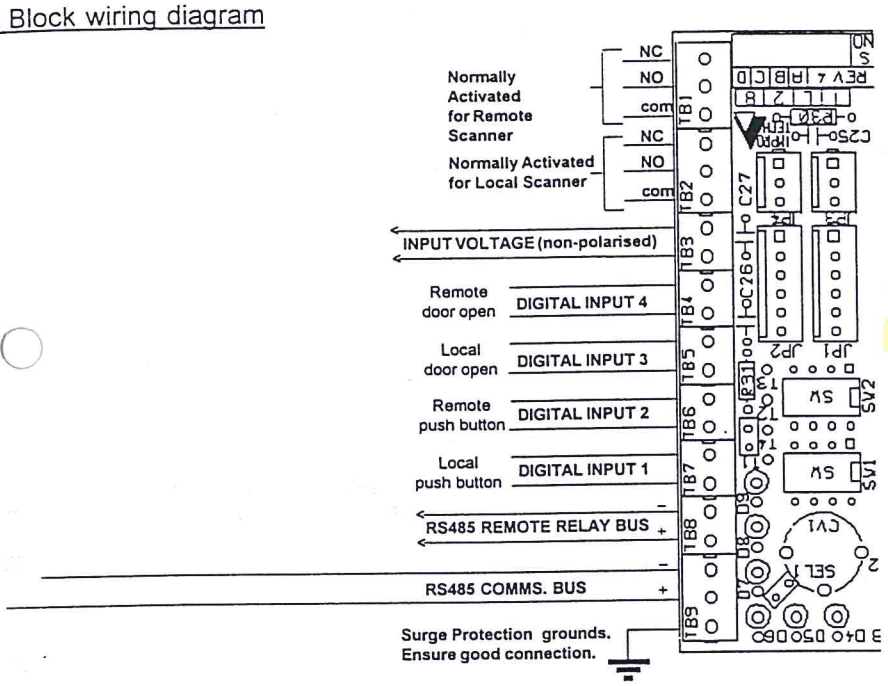
Applicable to the MSC IV Controller MSC9401 only



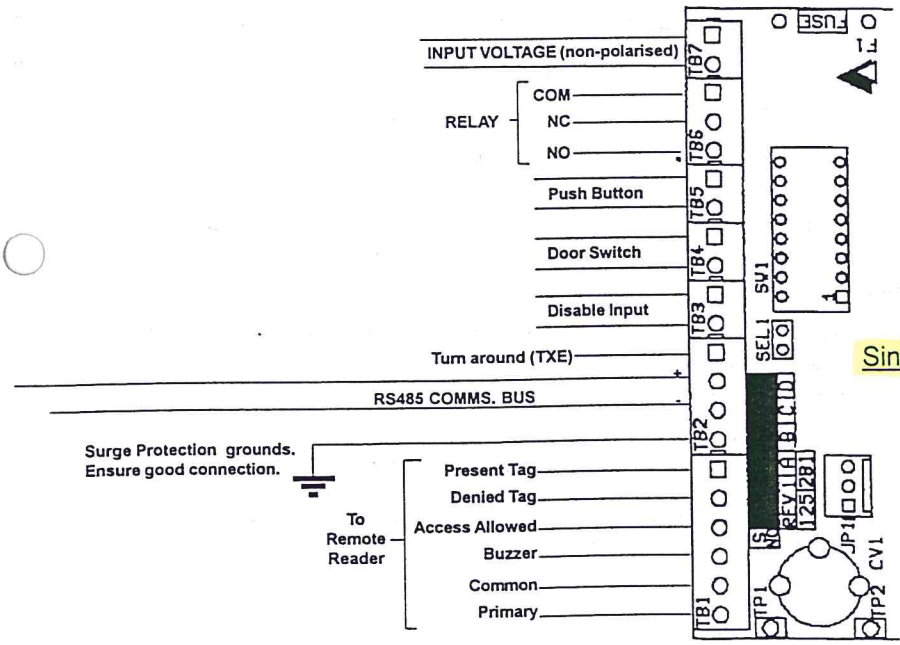
MS IV Controller (MSC9401) may be multi-dropped (up to 16 Controllers) on one system.

Data subject to change without notice

nal Block wiring diagram



Multi-Scan IV
Dual Channel Terminal



Multi-Scan IV
Single Channel Terminal

INSTALLATION GUIDE

POSITIONING OF THE MULTI-SCAN IV CONTROLLER

The Multi-Scan IV Controller can be mounted on virtually any surface, including metal. It can also be mounted next to other Controllers as the reader coil is located at the front of the cabinet. The cabinet has 3 holes in the base of the cabinet for mounting purposes and 'break out' cable exit holes at the top and bottom of the cabinet base.

CONNECTING UP THE MULTI-SCAN IV CONTROLLER

Power Connections

10 V to 14 V AC or 12 V to16 V DC is connected to the unit at TB12. The input is non-polarized and fused at 500 mA Four fused voltage outputs (TB11-TB8) are available for powering up the Multi-Scan IV Terminals. They all share a single fuse, rated at 5 A maximum. If required the fuse rating may be lowered according to the load (*eg* units, door strikes, *etc*). For distances up to 25 m (82ft), 2-wire ripcord rated at 5 A is recommended. For longer distances 2-core cable rated at 15 A should be used, to prevent excessive voltage drop.

NOTE: If units are separated by long distances that make the use of a common power supply difficult, they may be individually powered at their location.

RS485 Communication Bus

Use a screened, twisted pair cable (minimum 0,2 mm 2 conductor) for all communication. Connect the drain wire for the screen to the ground point at TB4, which in itself should be connected to a good EARTH ground. Individual, separated Earth connections for each unit should be made to prevent possible ground loops. The maximum distance of this cable is 1 km (3 300 ft).

RS485 Remote Relay Bus (Dual Channel Terminal ONLY)

The Remote Relay Bus is used to link up to 8 remote relays at 500 m (16,40 ft) to the Dual Channel Terminal. The remote relay is an optional unit which may be ordered.

Communications Baud Rate Change

Multi-Scan IV Controllers with firmware Revision V2.00 and later, communicate with the Terminals at 19 200 Baud rate. Controllers older than V2.00 communicate at 2 400 Baud rate. Ensure that the baud rate DIP switches on the Single Channel and Dual Channel Terminals are set at the correct setting for the Controller being used.

Dual Channel Terminals with firmware revision V2.3A or later are required for communicating with Multi-Scan IV Controllers V2.00 or later. If your Multi-Scan IV Controller has firmware Revision V2.00 or later, and your Dual Channel Terminals are older than V2.3A, then the firmware of your Dual Channel Terminals must be

upgraded to V2.3A or later. Please contact your Impro products distributor.

Alarm Inputs

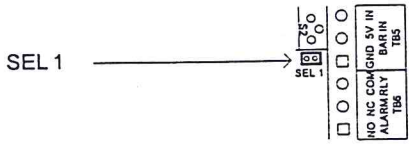
The digital inputs require the use of zero potential contacts to switch the inputs. The inputs are Active High (Open Contact). If only one input is being used, the other must be shorted out, because unconnected inputs assume a high level.
If the inputs are left unconnected they assume a high level status due to internal pull-up resistors.
A single pair cable (0,2 mm² conductor) can be used for these inputs.

Termination Resistors

Certain sites may experience "Time-outs" on Multi-Scan IV Terminals, which are caused by reflections on the RS485 lines. This is especially true if the transmission lines are long, or multiple length "STAR" formations are used.

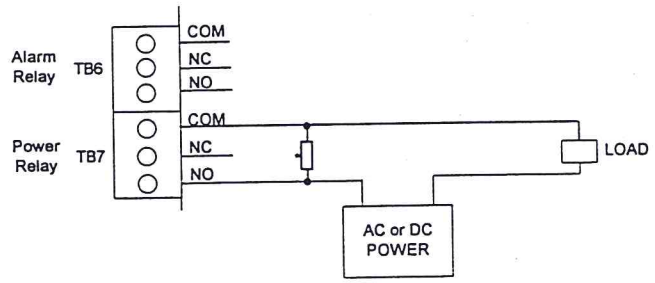
To solve the problem, it is necessary to terminate the lines. The value of terminating resistor will vary but values in the range of 1 k Ω to 100 Ω will suffice. Only reduce the terminating resistor to the lower minimum of 100 Ω if absolutely necessary. Also, only add termination resistors at the **BEGINNING** and **END** of a run of cable, **NOT** at every unit on the cable.

Shown below is the socket (SEL1) where the termination resistor is inserted:



Relay Outputs

2 relay outputs are provided for Alarm Relay (TB6) and Power Relay (TB7). **Note** the Power Relay is **ONLY** rated at **1.5 A, 30 V DC / 250 V AC, DO NOT EXCEED THIS!.** 2 or 3 Core cable rated at 2 A can be used depending upon contact requirement. Below is the recommended Arc Suppression circuitry:



NB:

represents the Relay Contact Arc Suppression circuitry. Examples are shown below for AC or DC powered latches.

AC [1] —▭—
[2] —C R—

Metal Oxide Varistor, (voltage rating dependent on AC voltage).
C=0.47 uF, 400 V min and
R=100 ohms, 1/2W.

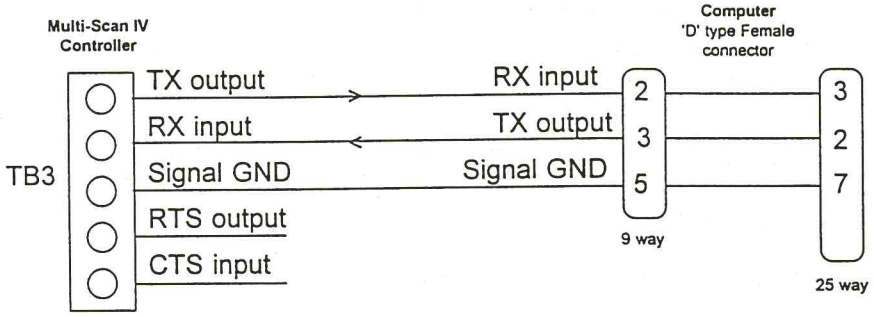
DC [1] —▷|+—
[2] —▭—

Diode, 1000 VPRV min.
e.g. 1N4007
Metal Oxide Varistor, 30 V min.

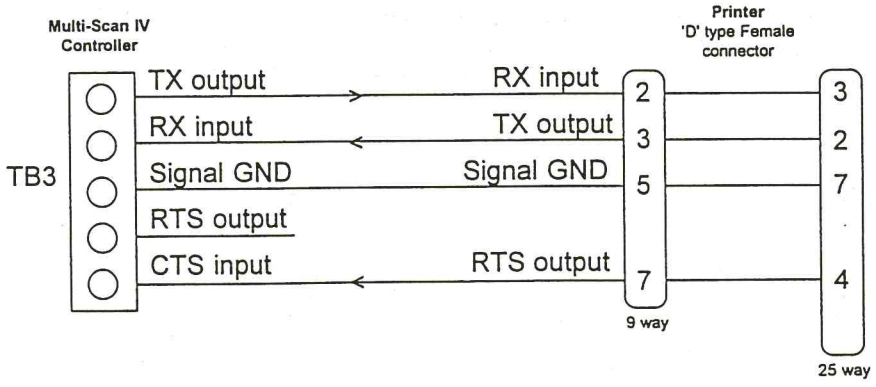
RS232 Serial Port

A computer or serial printer can be connected to the RS232 Serial Port (TB3) with a 6-core screened cable (with 0,2 mm conductors), with a maximum cable length of 25 m (82ft).

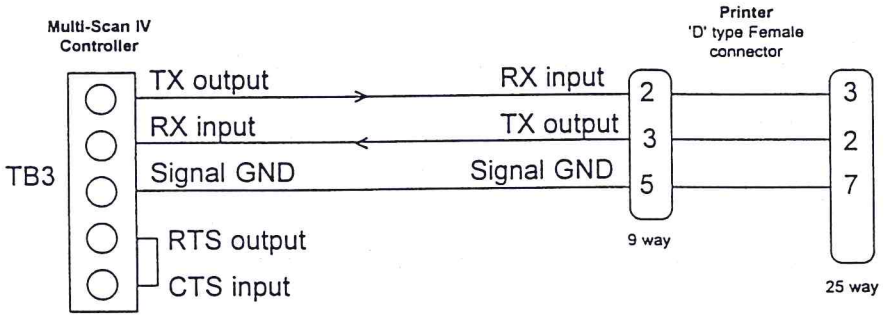
Connection to Computer



Hardware Handshake connection to Serial Printer

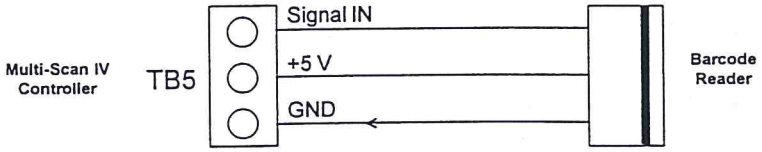


Software Handshake connection to Serial Printer



Barcode Reader

An optical barcode reader can be connected to the Multi-Scan IV Controller at TB5. The barcode reader is normally located alongside the Multi-Scan IV Controller cabinet for ease of reading cards. (Refer to the necessary barcode reader manual for cable specifications.)



Dip Switches

SW1	ON	OFF
1	Strict APB ON (Do not allow exit on APB violation)	Strict APB off (Allow exit on APB violation)
2	RESERVED - Must be OFF	
3	RESERVED - Must be OFF	
4	Store\Print only transactions which are violations (Rev.2.00 or later Firmware)	Store\Print all Transactions
5	Privileged tags APB control	No APB control for Privileged Tags
6	Stop access when transaction buffer full	Do not stop access when transaction buffer full
7	Alarm when transaction buffer full	No alarm when transaction buffer full
8	Arm inputs automatically when last person out	Manual arming of inputs

SW2	ON	OFF
1	Unit address bit 0 ┐	
2	Unit address bit 1 ├ (see below)	
3	Unit address bit 2 ┘	
4	Unit address bit 3	
5	Input #3 and input #4 on Dual Channel Terminals are Scanner Disable Inputs (for vehicle loop detectors, etc.)	Input #3 and Input #4 on Dual Channel Terminals are Door Open Sensors
6	RESERVED - Must be OFF	
7	RESERVED - Must be OFF	
8	Supervisor Unlock ON (Master or Privileged tag must be in already for Normal Tags to be allowed access)	Supervisor Unlock OFF

The unit address is configured as follows:

SW2 - 4	SW2 - 3	SW2 - 2	SW2 - 1	Controller Address
OFF	OFF	OFF	OFF	A
OFF	OFF	OFF	ON	B
OFF	OFF	ON	OFF	C
OFF	OFF	ON	ON	D
OFF	ON	OFF	OFF	E
OFF	ON	OFF	ON	F
OFF	ON	ON	OFF	G
OFF	ON	ON	ON	H
ON	OFF	OFF	OFF	I
ON	OFF	OFF	ON	J
ON	OFF	ON	OFF	K
ON	OFF	ON	ON	L
ON	ON	OFF	OFF	M
ON	ON	OFF	ON	N
ON	ON	ON	OFF	O
ON	ON	ON	ON	P

Since the unit address appears in all printed reports, the unit address may be used to differentiate the reports from different units, even in stand-alone operation (direct connection to serial printer).

SW3 - RESERVED ALL Switches must be OFF

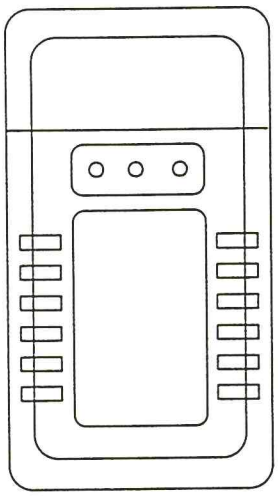
When the Multi-Scan IV Controller is powered up the unit address is shown in HEX. *eg* "Ad00". The HEX address '00' corresponds to Controller address 'A', 'O' corresponds to 'B', *etc.*

NOTE:

When the Multi-Scan IV Controller is first powered up, it may display the message 'ERR1'. This means that the Controller has detected that the internal tables are corrupt. Press the ESC key to reinitialize the internal tables.

MULTI-SCAN IV
SINGLE CHANNEL TERMINAL

MSS9400



INSTALLATION MANUAL

impro
TECHNOLOGIES (PTY) Ltd

Ref: MSSIMN03.PM5
Issue: 5
Date: 4 April 1995

IMPORTANT NOTICE

Although all efforts have been made to make this manual as accurate as possible, Impro Technologies (Pty) Ltd does NOT accept any liability for errors or omissions. The data contained in this manual supersedes any other information published on the Multi-Scan IV Single Channel Terminal. We further reserve the right to amend/improve the equipment and manual without notice.

GUARANTEE / WARRANTY

Impro Technologies (Pty) Ltd warrants that the Products furnished under this agreement will be free from material defects in material and workmanship for a period of one year from the date of shipment. The Customer shall provide notice to Impro Technologies (Pty) Ltd of each such defect within one week after the Customer's discovery of such defect. The sole obligation and liability of Impro Technologies (Pty) Ltd under this warranty shall be to repair or replace as its option, without cost to the Customer, the product or part which is so defective and as to which such notice is given.

Upon request by Impro Technologies (Pty) Ltd, the product or part claimed to be defective shall immediately be returned at the Customer's expense to Impro Technologies (Pty) Ltd. Replaced or repaired products or parts will be shipped to the Customer at the expense of Impro Technologies (Pty) Ltd.

There shall be no warranty or liability for any products or parts which have been subject to misuse, accident, negligence, failure of electric power or modification by the Customer without Impro Technologies (Pty) Ltd written approval. Final determination of warranty eligibility shall be made by Impro Technologies (Pty) Ltd. If a warranty claim is considered invalid for any reason, the Customer will be charged for services performed and expenses incurred by Impro Technologies (Pty) Ltd in handling and shipping the returned item.

As to replacement parts supplied or repairs made during the original warranty period, the warranty period of the replacement or repaired part shall terminate with the termination of the warranty period with respect to the original product or part.

As Impro Technologies (Pty) Ltd has no control over where the product is used, or how it is installed, no liability for ANY consequential damages can be accepted, whether due to malfunction, design, deficiency, implementation or any cause whatsoever.

THE FOREGOING WARRANTY CONSTITUTES IMPRO TECHNOLOGIES (PTY) LTD SOLE LIABILITY AND THE CUSTOMER'S SOLE REMEDY WITH RESPECT TO THE PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES, LIABILITIES AND REMEDIES EXCEPT AS THUS PROVIDED, IMPRO TECHNOLOGIES (PTY) LTD DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDED ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Multi-Scan IV Single Channel Terminal is designed and manufactured by:

Impro Technologies (PTY) Ltd
P.O. Box 15407
Westmead
3608
Republic of South Africa

Phone: (031) 7001087
Fax: (031) 7001511
Phone:(INTL):(27)317001087
Fax: (INTL):(27)317001511

CONTENTS

Introduction

The Multi-Scan IV Single Channel and Dual Channel Terminals are proximity access terminals designed for use with the Multi-Scan IV Controller.

A Multi-Scan IV system can have up to 4 terminals connected to it. These can be any combination of Single Channel or Dual Channel terminals. Thus a single Multi-Scan IV system can fully control up to 4 doors, anti-passback or non-anti-passback. A system with 4 anti-passback doors will require 4 Dual Channel Terminals, as well as 4 Remote Readers.

The Multi-Scan IV Single Channel Terminal can be used for portals where anti-passback control is not required.

Although the Single Channel Terminal is capable of reading only one proximity channel and cannot distinguish in and out access, it also has provision for a Remote Reader, to be connected in parallel with the on-board reader. This facilitates the use of a vandal resistant Remote Reader, with the Single Channel Terminal.

Each Multi-Scan IV Controller is capable of controlling one anti-passback zone, with up to 4 doors into/out of the zone.

The Multi-Scan IV controller communicates with the Multi-Scan IV Terminals using a two-wire RS485 bus. The terminals are multi-dropped off this bus, making the wiring of the system very convenient, cost effective and easy. Besides two communication wires, each terminal also requires two power wires. The communication between the Multi-Scan IV Controller and the terminals is at 19 200 Baud.

The Multi-Scan IV terminals support:

- Anti-tamper switches
- Door open sensors
- Pushbutton overrides
- Scanner disable inputs (for vehicle loop detectors, etc.)
- Buzzer
- 3 LED indicators

The on-board proximity readers in the terminals are capable of reading a proximity tag through most building materials, except metal. This makes installation of a system very easy, and in most cases, the units can be mounted on the 'secure side'. Where this is not possible, a Remote Reader should be used.

Specifications

Processor:	12 MHz 8032 CPU.
Power Requirements:	200 mA @ 12 - 16 V DC or 10 - 14 V AC, with a 2 A pico fuse on-board.
Size: (Approx.)	L = 161 mm(6,3"), B = 90 mm(3,5"), H = 45 mm(1,8").
Digital Inputs:	3 x Dry contact inputs, protected to ±80 V.
Relay output:	Integrated SPDT 30 V DC / 250V AC @ 1,5 A.
RS 485 Port:	Link between Multi-Scan IV controller and Multi-Scan IV terminals @ 19 200 baud, 8 bit, no parity and 1 stop bit.
Tag Readers:	Single channel, with a remote reader attachable in parallel to the on-board reader.
Remote Readers:	Designed to operate a maximum of 25 m (82ft) from the unit, can be fitted in harsh environments, and include the three status LEDs (as are fitted to the main cabinet), and an internal buzzer.
Status:	Indicated by three LEDs. One indicates 'Power on / Present tag', the second lights on receipt of a valid code, 'Access Allowed', and the third lights on 'Access Denied'.
Reading distances:	Approximately 100 mm (4") from the coils (in base of cabinet) but depends on the type of tag used. Rectangular tags read slightly further than the circular ones.
Barcode Channel:	One barcode channel is available but will be discontinued on future models..
Anti-tamper Switch:	Integrated into cabinet - 3 A, 125 V AC micro switch with NO and NC contacts. This switch is wired to the CPU board.
Positioning:	The unit must not be mounted on or adjacent to any metallic surface including steel reinforcing rods. Three Screw holes are provided in reader base.
Environmental:	Temperature range: -10°C(+14°F) to +70°C(+158°F). Humidity range: 0-95 % non condensing.
Coil frequency:	281 250 Hz or 125 000 Hz.
Buzzer:	Piezo electronic buzzer on CPU board inside cabinet.

Multi-Scan IV Single Channel Terminal

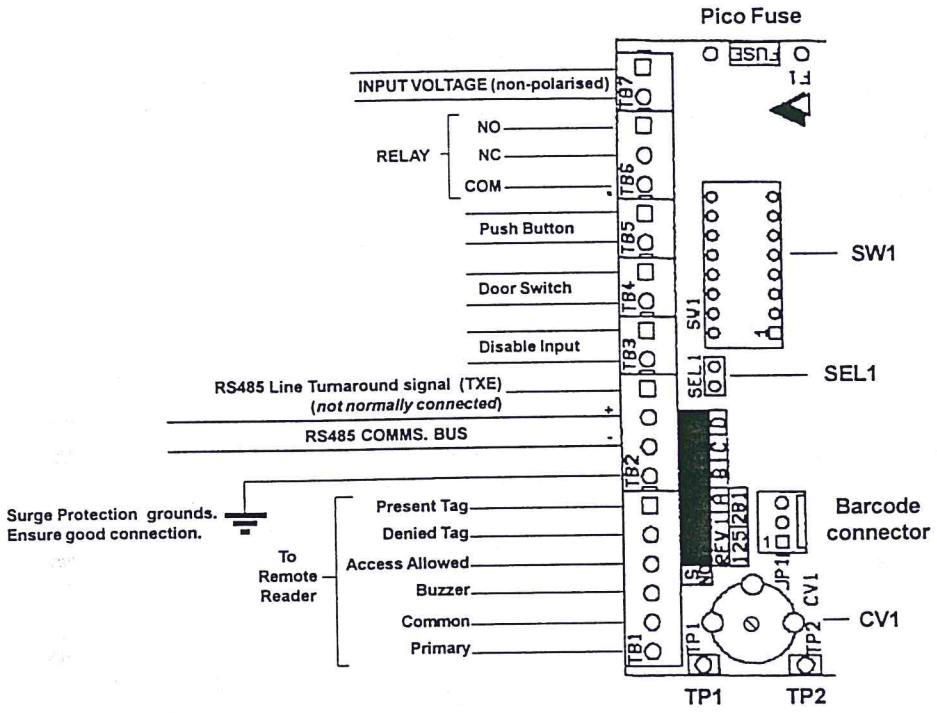


Fig.1

Data subject to change without notice

INSTALLATION GUIDE

POSITIONING OF THE MULTI-SCAN IV TERMINAL

Depending on the environment, the Multi-Scan IV Terminal should be mounted in a secure area of a building, and indoors. However, as it is preferable to place the unit where the LEDs are visible, enabling the user to see whether access has been allowed or not. It is often necessary to make use of a Remote Scanner with its LEDs. These can be located a maximum of 25 m (82ft) from the Multi-Scan IV Terminal, and can be mounted on, next to, or inside the door to be controlled.

NOTE : The system **CANNOT** operate through metal.
Avoid: a) mounting units close to a metal surface or steel reinforcing rods.
b) having the distance between any two units less than 500 mm(19,7").

CONNECTING UP THE MULTI-SCAN IV TERMINAL

Power Connections

200 mA at 12 to 16 V AC or 10 to 14 V DC is connected to the unit at TB7. The input is non-polarized and fused on-board at 2 A. For distances up to 25 m (82ft), 2-wire ripcord rated at 5 A is recommended. For longer distances 2-core cable rated at 15 A should be used, to prevent excessive voltage drop.

NOTE: If units are separated by long distances that make the use of a common power supply difficult, they may be individually powered at their location.

RS485 Communications Bus

For all communications a screened, twisted pair cable (minimum 0,2 mm^2 conductor) should be used. The drain wire for the screen should be connected to the earth point at TB2, which in itself should be connected to a good EARTH ground. Individual, separated earth connections for each unit should be made to prevent possible ground loops.

Digital Inputs

The digital inputs require the use of zero potential relay contacts to switch the inputs. The inputs are Active High (Open Contact).

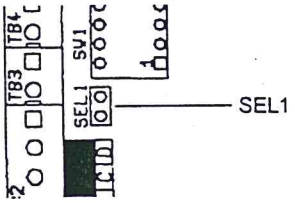
If the inputs are left unconnected they assume a high level status due to internal pull-up resistors.
A single pair cable (0,2 mm^2 conductor) can be used for these inputs.

Termination Resistors

Certain sites may experience "Time-outs" on Multi-Scan IV Terminals, which are caused by reflections on the RS485 lines. This is especially true if the transmission lines are long, or multiple length "STAR" formations are used.

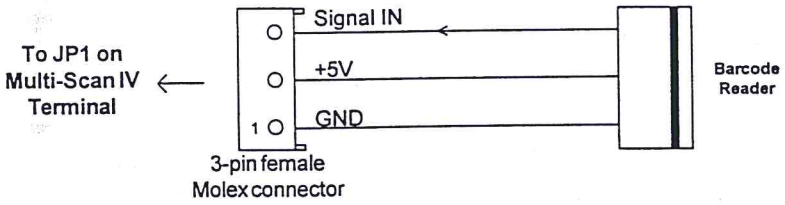
To solve the problem, it is necessary to terminate the lines. The value of terminating resistor will vary but values

in the range of 1 K Ω to 100 Ω will suffice. Only reduce the terminating resistor to the lower minimum of 100 Ω if absolutely necessary. Also, only add termination resistors at the **BEGINNING** and **END** of a run of cable, **NOT** at every unit on the cable. When the wiring is carried out in a "star" formation, then a termination resistor can be added at the end of each cable run which exceeds 100 m. The socket (SEL1) where the termination resistor is inserted is shown below:



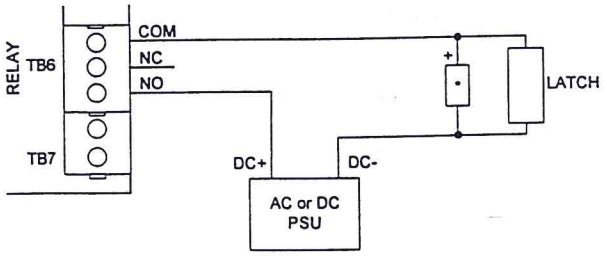
Barcode Reader (*if unit ordered with Barcode*)

An optical barcode reader can be connected to the Multi-Scan IV Terminal at the Molex connector JP1. (Refer to the necessary barcode reader manual for cable specifications.). The wiring diagram from the barcode reader to a female 3-pin Molex connector is shown below. See Fig. 1 page 6 for JP1 location.



Relay Contact Outputs

One relay output is provided to control for example a door latch, rated at **1,5 A; 30 V DC / 250 V AC** 2 or 3 Core cable rated at 2 A can be used depending upon contact requirement. The recommended Arc Suppression circuitry is shown below:



NB:

represents the Relay Contact Arc Suppression circuitry. Examples are shown below for AC or DC powered latches.

AC [1] — Metal Oxide Varistor (voltage rating dependent on latch AC voltage).

[2] C R — C=0,47 uF, 400 V min and R=100 ohms, 1/2 W.

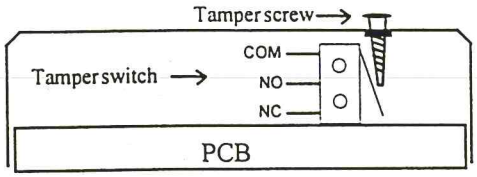
DC [1] — Diode, 1000 VPRV min. e.g. 1N4007

[2] — Metal Oxide Varistor, 30 V min.

Anti-tamper Switch

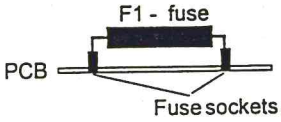
The anti-tamper switch is located in the area underneath the terminal blocks. The anti-tamper screw must be in at all times. The screw is inserted from the top of the cabinet after the cabinet lid is put on. The switch is wired to the PCB using the normally open & common terminals, and is always enabled. The terminations for the switch are shown below:

COM = common connection
NO = normally open connection
NC = normally closed connection



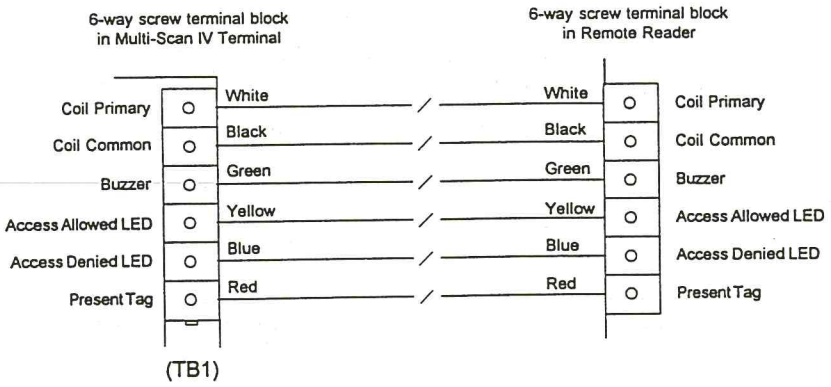
Pico Fuse

The fuse can be removed from the fuse socket (shown below) and replaced with a new fuse if required. The fuse is a 2 A Pico Fuse.



Remote Reader

Connection for the Remote Reader can be made to TB1. 6-Core screened cable with 0,2 mm² conductors is recommended. The unit can be mounted at least 25 m (82ft) away but not closer than 500 mm (20") to its main unit. The Remote Reader is in parallel with the internal reader.



Tuning the Multi-Scan IV Terminal

Tuning the Multi-Scan IV Terminal's internal reader coil

(See Fig.1 on page 6 for Test point locations.)

1) Disconnect the Remote Reader if one is being used.
2) Set the digital volt meter to read DC voltage.
3) Connect the negative lead of a digital volt meter to TP1 (GND).
4) Connect the positive lead of the digital volt meter to TP2 (TUNE).

5) Adjust trimcap (CV1) to obtain **minimum** voltage reading on the digital volt meter.
6) Test the reading range with a few tags.

Tuning with a Remote Reader connected

NOTE: The Multi-Scan IV Terminal internal reader coil must be tuned before tuning the remote reader.

1) Power down unit.
2) On DIP switch SW1, set S8 to ON position and power up unit. The unit is now in TEST MODE.
3) The unit will now beep continuously when a tag is presented. Adjust the tuning capacitor on the Remote Reader while presenting a tag until the best reading distance is obtained. A number of different tags should be used to obtain an average reading distance.
4) When tuning is completed set SW1 switch S8 to OFF position and power down and power up the unit again so that the unit returns to normal mode of operation.

DIP Switch Settings

NOTE: **After changing the DIP switches the unit must be powered down and powered up again to read the DIP switches.**

SW1	ON	OFF
1	Door Address bit 0 (see below)	
2	Door Address bit 1	
3	RESERVED - Must be OFF	
4	RESERVED - Must be OFF	
5	Enable door open sensing	Disable door open sensing
6	Disable the reader when the Disable Input has an 'open contact'	Disable the reader when the Disable Input has a 'closed contact'
7	19200 Baud Rate (Controller Firmware V2.00 or later)	2400 Baud Rate (Controller Firmware older than V2.00)
8	Test Mode On (for tuning reader)	Test Mode Off (normal operation)

Multi-Scan Controllers with firmware Revision V2.00 and later, communicate with the terminals at 19200 Baud rate. Controllers older than V2.00 communicate at 2400 Baud. Ensure that the Baud rate DIP switch is set at the correct setting for the Controller being used.

The door address is configured as follows:

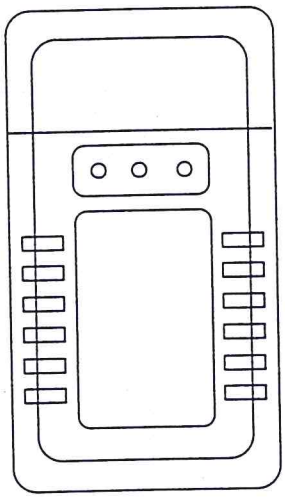
SW1 - 2	SW1 - 1	Door Address
OFF	OFF	1
OFF	ON	2
ON	OFF	3
ON	ON	4

MULTI-SCAN IV SINGLE CHANNEL TERMINAL BEEP CODES

2 BEEPS	Door Open
5 BEEPS	Anti-tamper

MULTI-SCAN IV
DUAL CHANNEL TERMINAL

MSD9400



INSTALLATION MANUAL

impro
TECHNOLOGIES (PTY) Ltd

Ref: MSDIMN04.PM5
Issue: 7
Date: 14 November 1995

IMPORTANT NOTICE

Although all efforts have been made to make this manual as accurate as possible, Impro Technologies (Pty) Ltd does NOT accept any liability for errors or omissions. The data contained in this manual supersedes any other information published on the Multi-Scan IV Dual Channel Terminal. We further reserve the right to amend/improve the equipment and manual without notice.

GUARANTEE / WARRANTY

Impro Technologies (Pty) Ltd warrants that the Products furnished under this agreement will be free from material defects in material and workmanship for a period of one year from the date of shipment. The Customer shall provide notice to Impro Technologies (Pty) Ltd of each such defect within one week after the Customer's discovery of such defect. The sole obligation and liability of Impro Technologies (Pty) Ltd under this warranty shall be to repair or replace as its option, without cost to the Customer, the product or part which is so defective and as to which such notice is given.

Upon request by Impro Technologies (Pty) Ltd, the product or part claimed to be defective shall immediately be returned at the Customer's expense to Impro Technologies (Pty) Ltd. Replaced or repaired products or parts will be shipped to the Customer at the expense of Impro Technologies (Pty) Ltd.

There shall be no warranty or liability for any products or parts which have been subject to misuse, accident, negligence, failure of electric power or modification by the Customer without Impro Technologies (Pty) Ltd written approval. Final determination of warranty eligibility shall be made by Impro Technologies (Pty) Ltd. If a warranty claim is considered invalid for any reason, the Customer will be charged for services performed and expenses incurred by Impro Technologies (Pty) Ltd in handling and shipping the returned item.

As to replacement parts supplied or repairs made during the original warranty period, the warranty period of the replacement or repaired part shall terminate with the termination of the warranty period with respect to the original product or part.

As Impro Technologies (Pty) Ltd has no control over where the product is used, or how it is installed, no liability for ANY consequential damages can be accepted, whether due to malfunction, design, deficiency, implementation or any cause whatsoever.

THE FOREGOING WARRANTY CONSTITUTES IMPRO TECHNOLOGIES (PTY) LTD SOLE LIABILITY AND THE CUSTOMER'S SOLE REMEDY WITH RESPECT TO THE PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES, LIABILITIES AND REMEDIES EXCEPT AS THUS PROVIDED, IMPRO TECHNOLOGIES (PTY) LTD DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDED ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Multi-Scan IV Dual Channel Terminal is designed and manufactured by:

Impro Technologies (PTY) Ltd
P.O. Box 15407
Westmead
3608
Republic of South Africa

Phone: (031) 7001087
Fax: (031) 7001511
Phone:(INTL):(27)317001087
Fax: (INTL): (27)317001511

CONTENTS

Introduction

The Multi-Scan IV Single Channel and Dual Channel Terminals are proximity access units designed for use with the Multi-Scan IV Controller.

The Multi-Scan IV Dual Channel Terminal has been designed to implement anti-passback control of a portal in a Multi-Scan IV system. It works in conjunction with an Impro Remote Scanner. Various types of remote scanners are available, including vandal resistant models.

A Multi-Scan IV system can have up to 4 terminals connected to it. These can be any combination of Single Channel or Dual Channel terminals. Thus a single Multi-Scan IV system can fully control up to 4 doors, anti-passback or non-anti-passback. A system with 4 anti-passback doors will require 4 Dual Channel Terminals, as well as 4 Remote Scanners.

Each Multi-Scan IV Controller is capable of controlling one anti-passback zone, with up to 4 doors into/out of the zone.

The Multi-Scan IV controller communicates with the Multi-Scan IV Terminals using a two wire RS485 bus. The terminals are multi-dropped off this bus, making the wiring of the system very convenient, cost effective and easy. Besides two communication wires, each terminal also requires two power wires.

The communication between the Multi-Scan IV Controller and the terminals is at 19200 Baud.

The Multi-Scan IV terminals support:

- Anti-tamper switch (built into the cabinet)
- Door open sensors (external, potential free contact)
- Pushbutton overrides (external, potential free contact)
- Scanner disable inputs (for vehicle loop detectors, etc.)
- Buzzer
- 3 LED indicators.

The on-board proximity readers in the terminals are capable of reading a proximity tag through most building materials, except metal. This makes installation of a system very easy, and in most cases, the units can be mounted on the 'secure side'. Where this is not possible, a Remote Scanner should be used.

Specifications

Processor:	16 MHz 8051 CPU.
Power Requirements:	200 mA @ 12 - 16 V DC or 10 - 14 V AC, with a 2 A pico fuse on-board.
Size: (Approx.)	L = 161 mm (6,3"), B = 90 mm (3,5"), H = 45 mm (1,8").
Digital Inputs:	4 x Dry contact inputs, protected to ±80 V.
Relay outputs:	2 Integrated SPDT 30 V DC / 250V AC @ 1,5 A.
RS 485 Port 1:	Link between Multi-Scan IV controller and Multi-Scan IV terminals @ 19 200 baud, 8 bit, no parity and 1 stop bit. (See Note on page 11 referring to baud rate).
RS 485 Port 2:	Link up to 8 remote relays at 500 m (1640ft), 4 associated with scanner channel A and 4 for channel B. Remote relays work in parallel to the on-board relays. Remote relays are optional units which can be ordered.
Scan Channels:	Two independent, capable of driving a remote scanner each. Channel 1 has the internal scanner in parallel with the remote.
Remote scanners:	are designed to operate a maximum of 25 m (82ft) from the unit, can be fitted in harsh environments, and includes the three status LEDs (as are fitted to the main cabinet), and an internal buzzer. (The on board scanner channel can also have a second scan head connected in parallel).
Status:	indicated by three LEDs. One indicates 'Power on / Present tag', the second lights on receipt of a valid code, 'Access Allowed', and the third lights on 'Access Denied'.
Reading distances:	Approximately 100 mm (4") from the coils (in base of cabinet) but depends on the type of tag used. Card / ID type tags read slightly further than the disc type.
Barcode Channels:	Two barcode channels are available, but will be discontinued on future models.
Anti-tamper Switch:	Integrated into cabinet - 3A, 125 V AC microswitch with NO and NC contacts. This switch is wired to the CPU board.
Positioning:	is simple as most materials have no effect on performance, except metal. Three Screw holes are provided in reader base.
Environmental:	Temperature range: -20 °C(+14 °F) to +70 °C(+158 °F). Humidity range: 0-95% non condensing.
Coil frequency:	281 250 Hz or 125 000 Hz.
Buzzer:	Piezoelectric buzzer on CPU board inside cabinet.

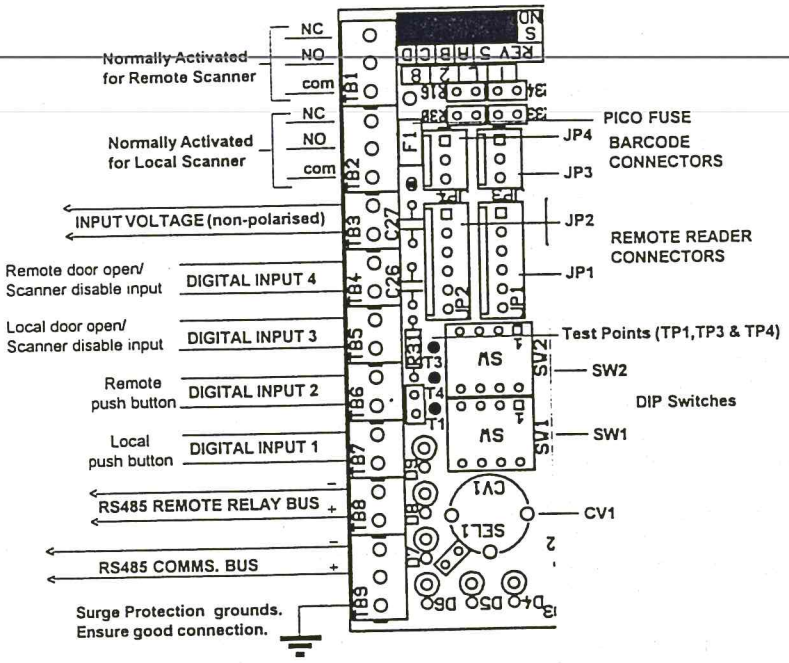


Fig.1 - TERMINAL BLOCK DIAGRAM

NOTE: REFER TO DIGITAL INPUTS HEADING

INSTALLATION GUIDE

POSITIONING OF THE MULTI-SCAN IV DUAL CHANNEL TERMINAL

Depending on the environment, the Multi-Scan IV Terminal should be mounted in a secure area of a building, and indoors. However, as it is preferable to place the unit where the LEDs are visible, enabling the user to see whether access has been allowed or not, it is often necessary to make use of a Remote Scanner with its LEDs. These can be located a maximum of 25 m (82ft) from the Multi-Scan IV Terminal, and can be mounted on, next to, or inside the door to be controlled.

NOTE : The system **CANNOT** operate through metal.
Avoid: a) mounting units close to a metal surface or steel reinforcing rods.
b) having the distance between any two units less than 500 mm(19.7").

CONNECTING UP THE MULTI-SCAN IV DUAL CHANNEL TERMINAL

Power Connections

200 mA at 12-16 V AC or 10-14 V DC is connected to the unit at TB3, the input is non-polarized and fused on-board at 2 A. For distances up to 25 m (82ft), 2-wire ripcord rated at 5 A is recommended. For longer distances, 2-core cable rated at 15 A should be used, to prevent excessive voltage drop.

NOTE: If units are separated by long distances that make the use of a common power supply difficult, they can be individually powered at their location.

RS485 Comm. Bus (Terminal & Remote Relay)

For all communications, a screened, twisted pair cable (minimum 0,2 mm² conductor) should be used. The drain wire for the screen should be connected to the earth point at TB9, which in itself should be connected to a good EARTH ground. Individual, separated Earth connections for each unit should be made to prevent possible ground loops.

Digital Inputs

The four digital inputs require the use of zero potential relay contacts to switch the inputs. The inputs are Active High (Open Contact). **Digital inputs #3 and #4 (remote door open/scanner disable inputs), should each be bridged with a wire link if not used.** This is due to the Dual Channel Terminals having "Door Open Sensing" enabled by default, and this causes the Dual Channel Terminal, as well as the Multi-Scan IV Controller to keep emitting the "Door Open" beep code, unless the inputs are bridged. The inputs should not be bridged if they are used as "Disable Scanner Inputs" (for vehicle loop detectors, etc.)

If the inputs are left unconnected they assume a high level status due to internal pull-up resistors.
A single pair cable (0,2 mm² conductor) can be used for these inputs.

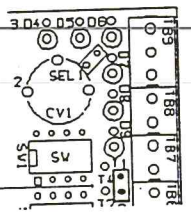
Termination Resistors

Certain sites may experience "Time-outs" on Multi-Scan IV Terminals, which are caused by reflections on the RS485 lines. This is especially true if the transmission lines are long, or multiple length "STAR" formations are used.

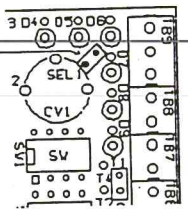
To solve the problem, it is necessary to terminate the lines. The value of terminating resistor will vary but values

in the range of 1k Ω to 100 Ω will suffice. Only reduce the terminating resistor to the lower minimum of 100 Ω if absolutely necessary. Also, only add termination resistors at the **BEGINNING** and **END** of a run of cable, **NOT** at every unit on the cable. When the wiring is carried out in a "star" formation, then a termination resistor can be added at the end of each cable run which exceeds 100 m. The sockets where the termination resistor is inserted are shown below.

SEL2
For RS485
Comms. Bus.

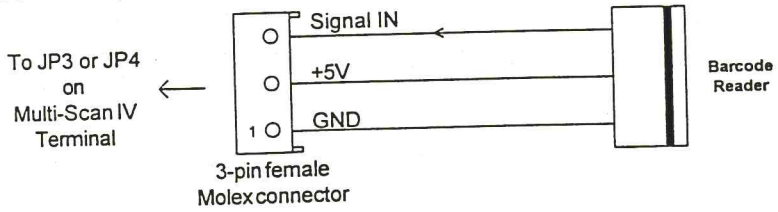


SEL1
For Remote
Relay RS485 Bus



Barcode Reader (If unit ordered with barcode facility).

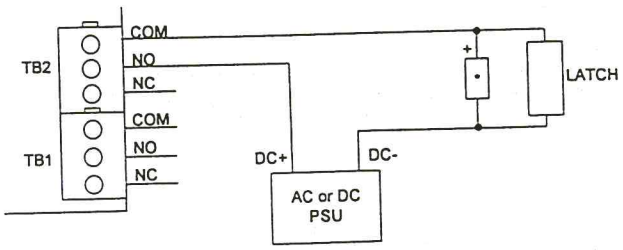
An optical barcode reader can be connected to the Multi-Scan IV Terminal at the Molex connector JP3 and JP4. (Refer to the necessary barcode reader manual for cable specifications.). The wiring diagram from the barcode reader to a female 3-pin Molex connector is shown below, also see Fig. 1 page 6 for JP3 & JP4 location.



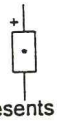
Only code 39 barcodes in a specific range can be read.

Relay Contact Outputs

Outputs are provided to control for example a door latch, rated at **1,5 A,30 V DC / 250 V AC.** 2 or 3 Core cable rated at 2 A can be used depending upon contact requirement. The recommended Arc Suppression circuitry is shown below:



NB:



represents the Relay Contact Arc Suppression circuitry. Examples are shown below for AC or DC powered latches.

AC [1] Metal Oxide Varistor (voltage rating dependent on latch AC voltage).

[2] C R C=0.47 uF, 400V min and R=100 ohms, 1/2 W.

DC [1] + Diode, 1000 VPRV min. e.g. 1N4007

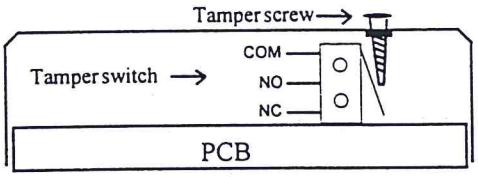
[2] Metal Oxide Varistor, 30 V min.

Data subject to change without notice

Anti-tamper Switch

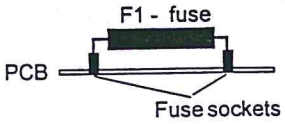
The Anti-tamper switch is located in the area underneath the terminal blocks. The anti-tamper screw must be in at all times. The screw is inserted from the top of the cabinet after the cabinet lid is put on. The switch is wired to the PCB using the Normally Open & Common terminals, and is always enabled. The terminations for the switch are shown below.

COM = common connection
NO = normally open connection
NC = normally closed connection



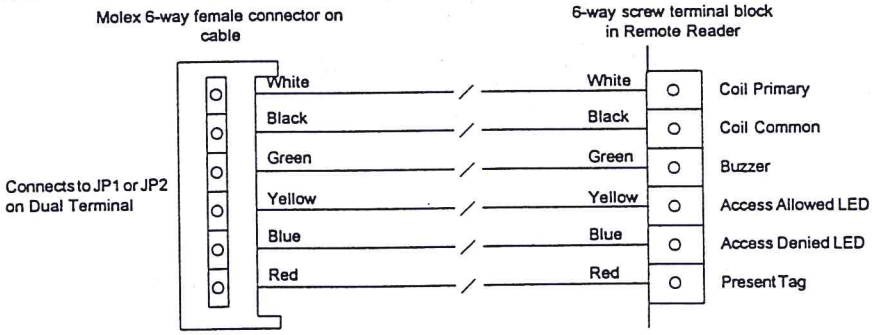
Pico Fuse

The fuse can be removed from the fuse socket (shown below) and replaced with a new fuse if required. The fuse is a 2 A Pico Fuse.



Remote Reader

Connection for the Remote reader can be made to JP1 or JP2. 6-Core screened cable with 0,2 mm² conductors is recommended. The unit can be mounted a maximum of 25 m (82ft) away but not closer than 500 mm (20") to its main unit. The Remote reader JP1 is in parallel with the internal scanner, JP2 is a separate input.



Tuning the Multi-Scan IV Terminal

Tuning the Multi-Scan IV Terminal's internal reader coil

(See Fig.1 on page 6 for Test point locations.)

1) Disconnect ALL Remote readers if any are being used.
2) Connect the negative lead of a digital volt meter to TP3 (GND).
3) Connect the positive lead of a digital volt meter to TP1 (TUNE).
4) Set the digital volt meter to read DC voltage.
5) Adjust trimcap (CV1) to obtain **minimum** voltage reading on the digital volt meter.
6) Test the reading range with a few tags.

Tuning with a Remote Reader connected to JP1

NOTE: The Multi-Scan IV Terminal internal reader coil must be tuned before tuning the remote reader.

1) Power down the unit.
2) On DIP switch SW1 set S4 to ON position and power up unit. The unit is now in TEST MODE.
3) The unit will now beep continuously when presenting a tag. Adjust the tuning capacitor on the remote reader while presenting a tag until the best reading distance is obtained. A number of different tags should be used to obtain an average reading distance.
4) When tuning is completed set SW1 switch S4 to OFF position and power down and power up the unit again so that the unit returns to normal mode of operation.

Tuning with a Remote Reader connected to JP2

NOTE: The Dual Terminal is always an anti-passback terminal and therefore must have a remote reader connected to JP2.

1) Power down the unit.
2) On DIP switch SW1 set S4 to ON position and power up unit. The unit is now in TEST MODE.
3) The unit will now beep continuously when presenting a tag. Adjust the tuning capacitor on the remote reader while presenting a tag until the best reading distance is obtained. A number of different tags should be used to obtain an average reading distance.
4) When tuning is completed set SW1 switch S4 to OFF position and power down and power up the unit again so that the unit returns to normal mode of operation.

DIP Switch Settings

NOTE: After changing the DIP switches the unit must be powered down and powered up again to read the DIP switches.

SW1	ON	OFF
1	BAUD RATE (see Table on pg.11)	
2	BAUD RATE (see Table on pg.11)	
3	Simultaneous Access IN/OUT	Cycled Access IN/OUT
4	Test Mode On (for tuning reader)	Test Mode Off (normal operation)

SW1 - 2	SW1 - 1	BAUD RATE
OFF	OFF	19 200
OFF	ON	9600
ON	OFF	4800
ON	ON	2400

NOTE: Multi-Scan IV Controllers with firmware Revision V2.00 boards and later, communicate with the terminals at 19 200 baud rate. Controllers older than V2.00 communicate at 2400 baud rate. Ensure that the baud rate DIP switches are set at the correct setting for the controller being used.

Dual Channel Terminals with firmware Revision V2.3A or later are required for communicating with Multi-Scan IV Controllers V2.00 or later. If your Multi-Scan IV Controller has firmware Revision V2.00 or later, and your Dual Channel Terminals are older than V2.3A, then the firmware of your Dual Channel Terminals must be upgraded to V2.3A or later. Please contact your Impro Products Distributor.

MULTI-SCAN IV DUAL CHANNEL TERMINAL BEEP CODES

2 BEEPS	Inside Scanner Door Open
3 BEEPS	Outside Scanner (Remote) Door Open
5 BEEPS	Anti-Tamper

DEFINITIONS:

Simultaneous Access In/Out
Used where separate entry/exit accesses are provided.
Cycled Access In/Out
Allows the use of a single bidirectional door or turnstile for entry/exit, preventing simultaneous Entry/Exit requests.
Test Mode
On power up the unit will go into test mode and will allow the rapid reading of tags so that the scanner can be tuned with ease.

The door address is configured as follows:

SW2 - 3	SW2 - 4
Reserved for future use, must be OFF.	

SW2 - 2	SW2 - 1	Door Address
OFF	OFF	1
OFF	ON	2
ON	OFF	3
ON	ON	4

The door open sensors on the Dual Channel Terminal may alternatively be used as Scanner Disable Inputs (for vehicle loop detectors, etc). This setting is a DIP switch setting on the Multi-Scan IV Controller, and has to be enabled on the Controller. When the Scanner Disable function is being used, then Input #3 has to have 'contact closed' or 'low level' in order for the on board scanner to operate. Input #4 has to have 'contact closed' or 'low level' for the Remote Scanner to operate. Please refer to the Multi-Scan IV Controller Installation Manual for additional information.