



Application Note for Using the Operator Station HE500TIU050/10X/11X/20X with the Mitsubishi A PLC Protocol

Protocol File Name

HE500TIU050 = Mitsi_R?.0xx

HE500TIU1xx = Mitsi_R?.1xx

HE500TIU2xx = Mitsi_R?.2xx

(The "?" = the TIU firmware revision)

Configuring the Operator Station

To verify the Automated Equipment type the Operator Station is setup for, watch the screen of the Operator Station on power up. The first screen message details the setup of the Operator Station. To configure the Operator Station for particular Automated Equipment, select the Automated Equipment in the Communication Settings from the Configure menu in **CBREEZE** software. Select the appropriate Manufacturer and the appropriate Remote Equipment Model. Then from the File menu select Update Protocol, the appropriate file name will appear in the file name field. The programmer may need to point to the correct folder name/location. If further information is required see the manual or **CBREEZE** help on update/change protocol.

Protocol Revisions

Version 1.08 Supports master only operation to the slave PLC via a communications module in the PLC.

Serial Port Format

The link settings of 9600 baud, eight data bits, no parity and 1 stop bit as default.

Configure Link To Remote Equipment

Select Remote Equipment Manufacturer: Mitsubishi

Select Remote Equipment Model: A Series

Baud Rate: 38400 19200 9600 4800 2400 1200 300

Parity: None Odd Even

Data Bits: Eight Seven

Stop Bits: One Two

Communication Mode: RS422/485 Four Wire (Tiu Master)

Network Mode Enable

Global Remote Node ID: 0

Protocol Format: 3

Cancel OK

The Mitsubishi A Series communications modules support four different protocol modes which are selected on the DIP switches or rotary switches of the module. **CBREEZE** and the TIU Operator Stations also support the four modes.

When configuring the communication link ensure that the Protocol Format box (see opposite) is set to the same protocol format on the Mitsubishi communications module.

There is an additional option in the communications module to enable/disable the use of a checksum. The module **MUST** be set to use a checksum.

Node Address

Node Addresses (Station numbers) are required with all four Protocol Modes. They must match at both the Operator Station and the PLC communication module. The node address can be set from 0 to 31.

Note some communications module only support RS232 and therefore a one to one link. Under these circumstances there may be no switches on the Communication Module to select the node address. In this case the node address is fixed at 0.

Configuration of Communications Module

There are various communications modules available dependant on the type of interface required and the model of the PLC. In general they fall into one of three groups.

Typical part number	Interface Type
AJ71UC24	RS232 and RS422
A1SJ71C24-R2	RS232 only
A1SJ71C24-R4	RS422 only

Typical Settings for a AJ71UC24

The AJ71UC24 contains a rotary selector for the mode, two rotary selectors for the station number, two banks of configuration DIP switches and an RS232 and RS422 interface.

The mode rotary selector switch has 16 positions (0 to F) and should be set according to which physical interface and which protocol mode is required. See below.

Switch Number	RS232	RS422
1	Protocol 1	No Protocol
2	Protocol 2	No Protocol
3	Protocol 3	No Protocol
4	Protocol 4	No Protocol
5	No Protocol	Protocol 1
6	No Protocol	Protocol 2
7	No Protocol	Protocol 3
8	No Protocol	Protocol 4

The Station Number rotary switches (X10 and X1) combined to give a number from 0 to 31. Numbers outside this range should not be set as the communications link will fail.

The Configuration DIP switches set baud rates and other interface settings. See below.

Switches	Setting Item	OFF	ON	Comments
SW11	Main Channel Settings	RS232C	RS422/485	Not used for modes 1 to 8 (above)
SW12	Data Bits Setting	7 Bits	8 Bits	Set the same as TIU
	Baud Rate Setting	300 600 1200 2400	4800 9600 19200	Set the same as TIU
SW13		OFF ON OFF ON	OFF ON OFF	
SW14		OFF OFF ON ON	OFF OFF ON	
SW15		OFF OFF OFF OFF	ON ON ON	
SW16	Parity Bit Setting	Disabled	Enabled	Set the same as TIU
SW17	Even/Odd Parity	7 Bits	8 Bits	Valid only when SW16 is ON
SW18	Stop Bit Setting	1 Bits	2 Bits	Set the same as TIU
Switches	Setting Item	OFF	ON	Comments
SW21	Sum Check Setting	NOT Set	SET	MUST be SET

SW22	Write During RUN	Disabled	Enabled	Must be ENABLED if you wish to write to the PLC when it is Running.
SW23	Computer Link/ Multidrop	Multidrop	Computer Link	Must be set ON. Computer Link
SW24	Master/Local setting	Multidrop Local Station	Multidrop Master Station	This is ignored when in Computer Link mode.

Typical Settings for a A1SJ71C24-R2

The A1SJ71C24-R2 contains a rotary selector for the mode, two banks of configuration DIP switches and an RS232 interface.

The mode rotary selector switch has 16 positions (0 to F) and should be set according to which protocol mode is required. See below.

Switch Number	RS232	RS422
1	Protocol 1	-
2	Protocol 2	-
3	Protocol 3	-
4	Protocol 4	-

The Configuration DIP switches set baud rates and other interface settings. See below.

Switches	Setting Item	OFF				ON			Comments
SW03	Unused	-				-			-
SW04	Write During RUN	Disabled				Enabled			Must be ENABLED if you wish to write to the PLC when it is Running.
	Baud Rate Setting	300	600	1200	2400	4800	9600	19200	Set the same as TIU
SW05		OFF	ON	OFF	ON	OFF	ON	OFF	
SW06		OFF	OFF	ON	ON	OFF	OFF	ON	
SW07		OFF	OFF	OFF	OFF	ON	ON	ON	
SW08	Data Bits Setting	7 Bits				8 Bits			Set the same as TIU
SW09	Parity Bit Setting	Disabled				Enabled			Set the same as TIU
SW10	Even/Odd Parity	7 Bits				8 Bits			Valid only when SW16 is ON
SW11	Stop Bit Setting	1 Bits				2 Bits			Set the same as TIU
SW12	Sum Check Setting	NOT Set				SET			MUST be SET

Typical Settings for a A1SJ71C24-R4

The A1SJ71C24-R4 contains a rotary selector for the mode, two rotary selectors for the station number, two banks of configuration DIP switches and an RS422 interface.

The mode rotary selector switch has 16 positions (0 to F) and should be set according to which protocol mode is required. See below.

Switch Number	RS232	RS422
5	-	Protocol 1
6	-	Protocol 2
7	-	Protocol 3
8	-	Protocol 4

The Configuration DIP switches set baud rates and other interface settings. See below.

Switches	Setting Item	OFF				ON			Comments
SW01	Master/Local setting	Multidrop Local Station				Multidrop Master Station			This is ignored when in Computer Link mode.
SW02	Computer Link/Multidrop	Multidrop				Computer Link			Must be set ON. Computer Link
SW03	Unused	-				-			-
SW04	Write During RUN	Disabled				Enabled			Must be ENABLED if you wish to write to the PLC when it is Running.
	Baud Rate Setting	300	600	1200	2400	4800	9600	19200	Set the same as TIU
SW05		OFF	ON	OFF	ON	OFF	ON	OFF	
SW06		OFF	OFF	ON	ON	OFF	OFF	ON	
SW07		OFF	OFF	OFF	OFF	ON	ON	ON	
SW08	Data Bits Setting	7 Bits				8 Bits			Set the same as TIU
SW09	Parity Bit Setting	Disabled				Enabled			Set the same as TIU
SW10	Even/Odd Parity	7 Bits				8 Bits			Valid only when SW16 is ON
SW11	Stop Bit Setting	1 Bits				2 Bits			Set the same as TIU
SW12	Sum Check Setting	NOT Set				SET			MUST be SET

Register Type Specification

Read and writes are supported to the following areas: -

Word Types

- Data registers (D)
- Special Data Registers (D)
- Link Registers (W)
- File Registers (R)
- Timer Values (T)
- Counter Values (C)

Bit Types

Reads and writes are performed on blocks of sixteen bits with the bits being packed into words.

Reads and Writes are supported to the following bit types...

- Relays (M)
- Special Relays (M)
- Inputs (X)
- Outputs (Y)
- Latch Relays (L)
- Step Relays (S)
- Link Relays (B)
- Annunciator Relays (F)
- Timer Contact (T)
- Timer Coil (T)
- Counter Contact (C)
- Counter Coil (C)

Register Type Ranges

Register Type	Bit / Word	Supported Register Ranges
Data Register D	Word	0 to 1023 (Decimal)
Special Data Registers D	Word	9000 to 9255 (Decimal)
Link Registers W	Word	0 to 3FF (Hexadecimal)
File Registers R	Word	0 to 8191 (Decimal)
Timer Present Value T	Word	0 to 2047 (Decimal)
Counter Present Value C	Word	0 to 1023 (Decimal)
Inputs X	Bit	0 to 7FF (Hexadecimal)
Outputs Y	Bit	0 to 7FF (Hexadecimal)
Internal Relay M	Bit	0 to 8191 (Decimal)
Special Relay M	Bit	9000 to 9255 (Decimal)
Latch Relay L	Bit	0 to 8191 (Decimal)
Step Relay S	Bit	0 to 8191 (Decimal)
Link Relay B	Bit	0 to 3FF (Hexadecimal)
Annunciator F	Bit	0 to 2047 (Decimal)
Timer Contact T	Bit	0 to 2047 (Decimal)
Timer Coil T	Bit	0 to 2047 (Decimal)
Counter Contact C	Bit	0 to 1023 (Decimal)
Counter Coil C	Bit	0 to 1023 (Decimal)

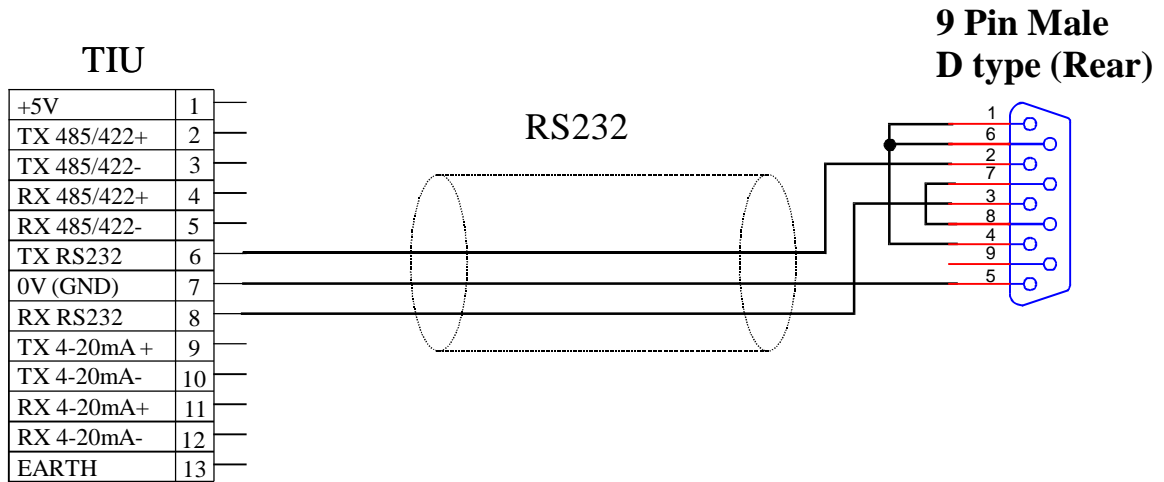
Using Bit Type Registers as Words

It is possible to use the bit type registers in places such as the screen of the Operator Station in a similar way to word type register. There are however two things to note.

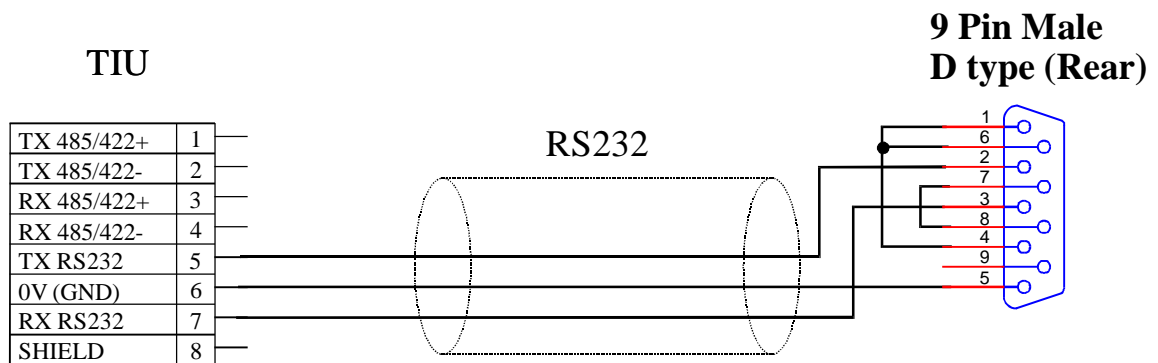
The location specified is the first bit that will be accessed along with the following 15 bits to make a full word.

The location specified must be on a word boundary. For example to read a word of internal Relays the location specified must be 0, 16, 32, 48 etc.

CONNECTING THE OPERATOR STATION TO THE MITSUBISHI A1SJ71C24-R2



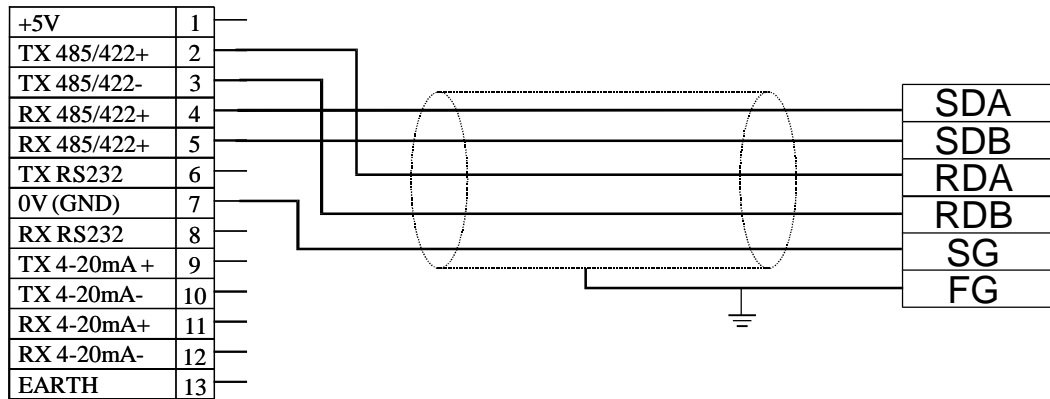
TIU 100/110 TO THE MITSUBISHI A1SJ71C24-R2



TIU 50/101/102/111/112/20X TO THE MITSUBISHI A1SJ71C24-R2

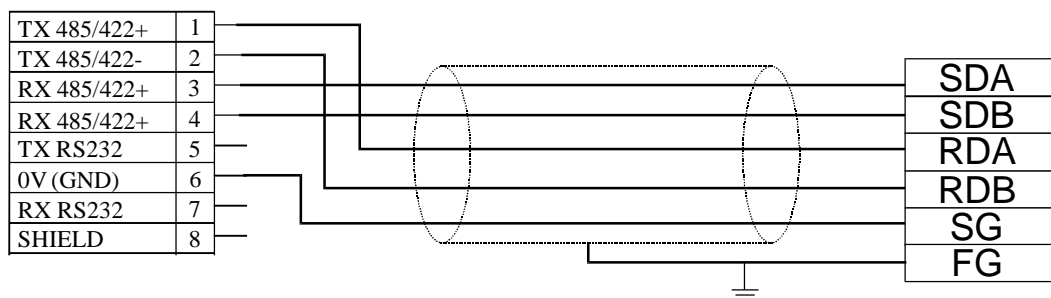
CONNECTING THE OPERATOR STATION TO THE MITSUBISHI AJ71C24

TIU



TIU 100/110 TO THE MITSUBISHI AJ71C24

TIU

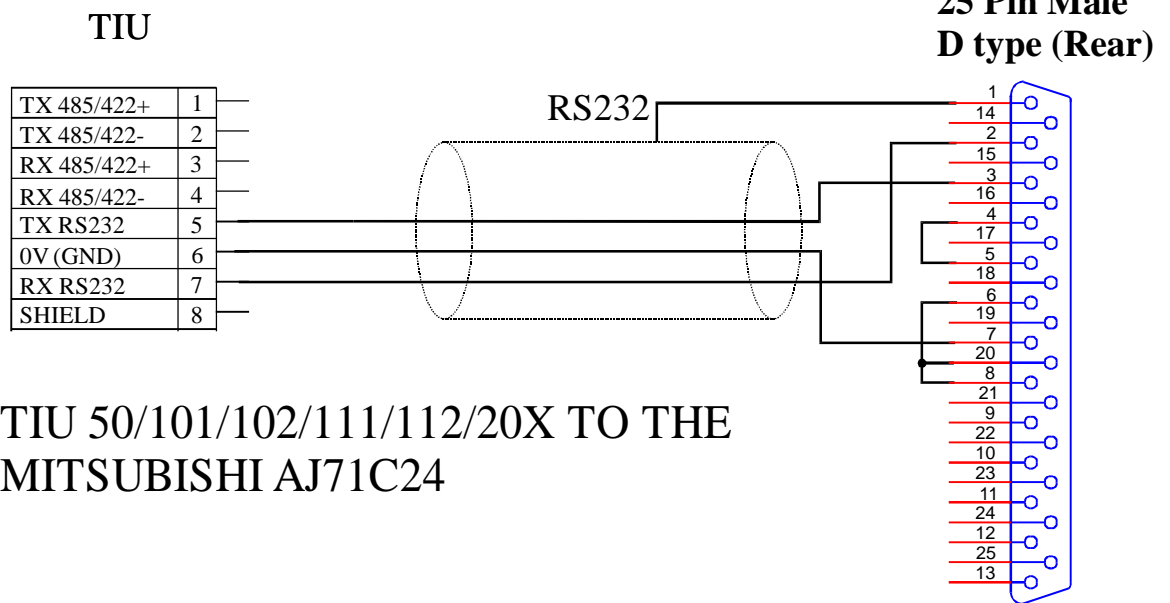
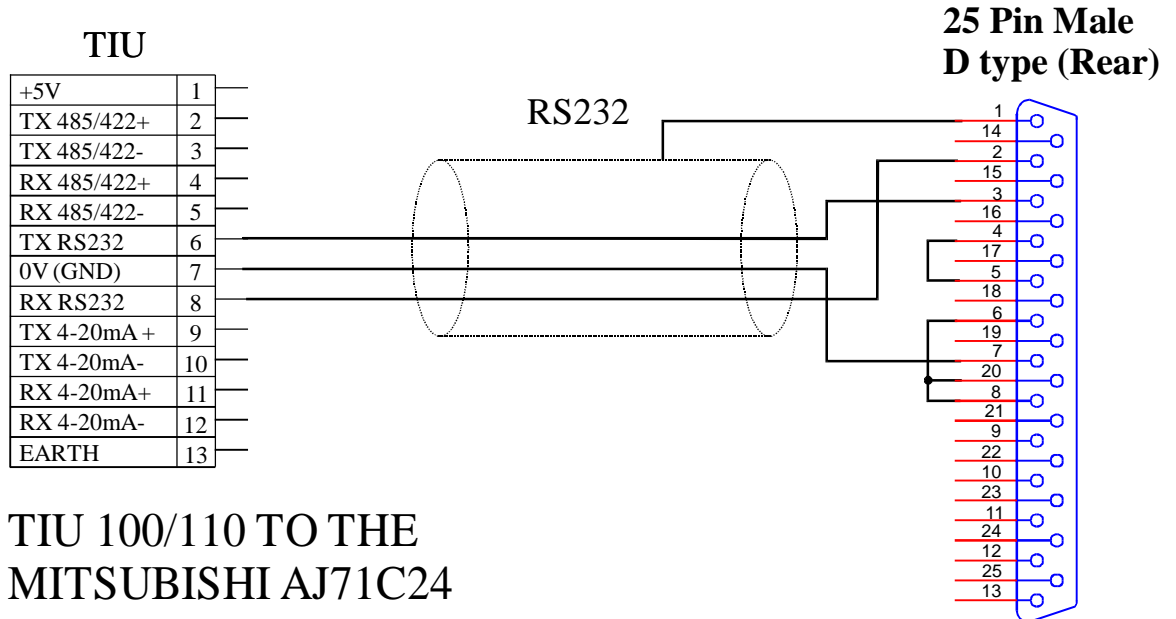


TIU 50/101/102/111/112/20X TO THE MITSUBISHI AJ71C24

Cable Individually Screened
Twisted Multipair BELDON 9503
Use Third Pair for 0V
Connect Screens to Earth
(FG) at PLC end.

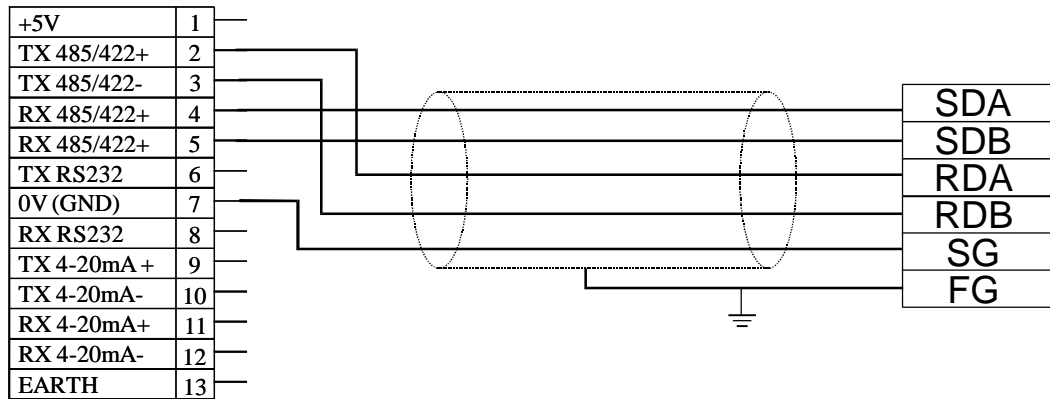
Please Note The AJ71C24 must be set
for Protocol Format 3, and the checksum
must be enabled. These settings are made
on the AJ71C24 DIP switches.

CONNECTING THE OPERATOR STATION TO THE MITSUBISHI AJ71C24



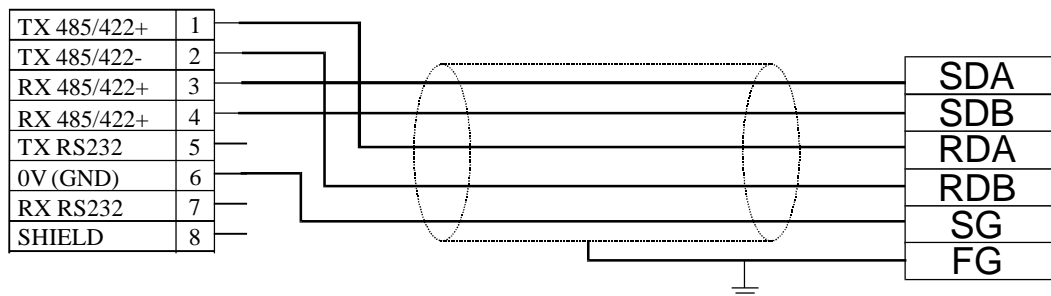
CONNECTING THE OPERATOR STATION TO THE MITSUBISHI AJ71C24

TIU



TIU 100/110 TO THE MITSUBISHI AJ71C24

TIU

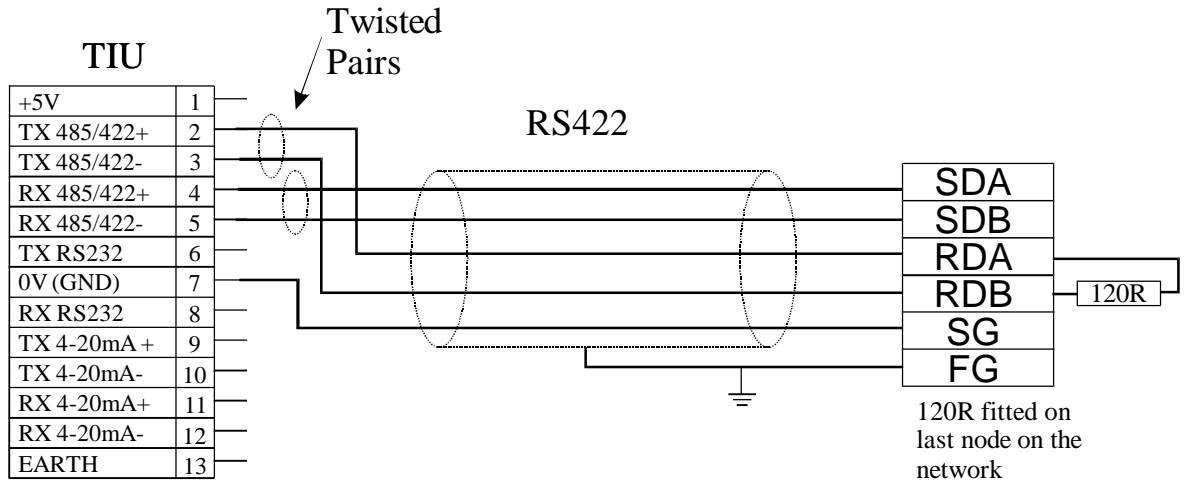


TIU 50/101/102/111/112/20X TO THE MITSUBISHI AJ71C24

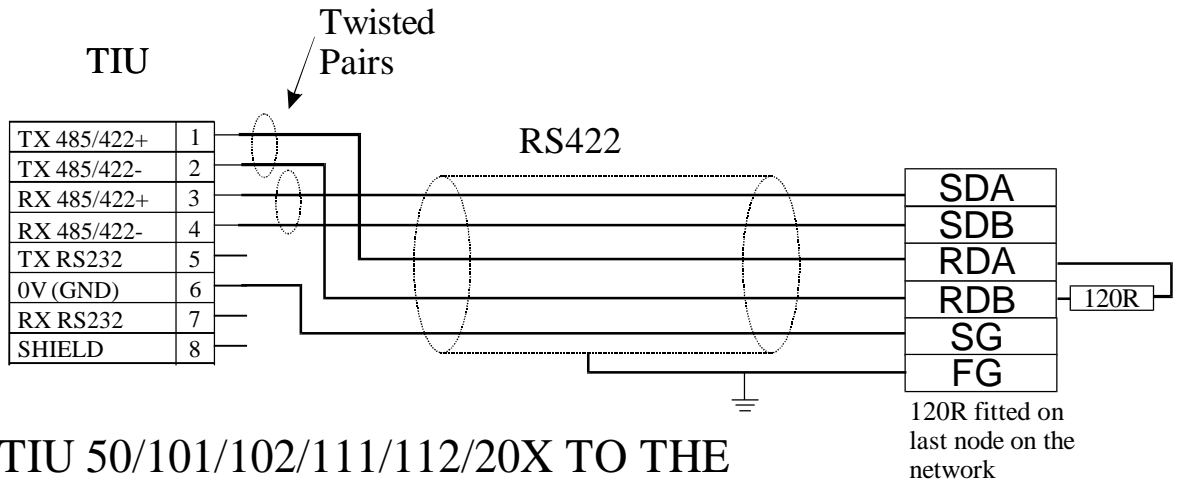
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CONNECTING THE OPERATOR STATION TO THE MITSUBISHI AJ71C24/A1SJ71C24-R4



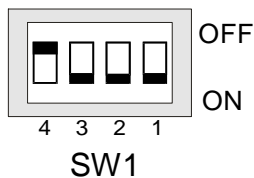
TIU 100/110 TO THE MITSUBISHI AJ71C24



TIU 50/101/102/111/112/20X TO THE MITSUBISHI AJ71C24

Configuration Bank		
Switch	ON	OFF
1	Pull-up	No Pull-up
2	120 termination	No termination
3	Pull-down	No Pull-down
4	Reserved for future use	

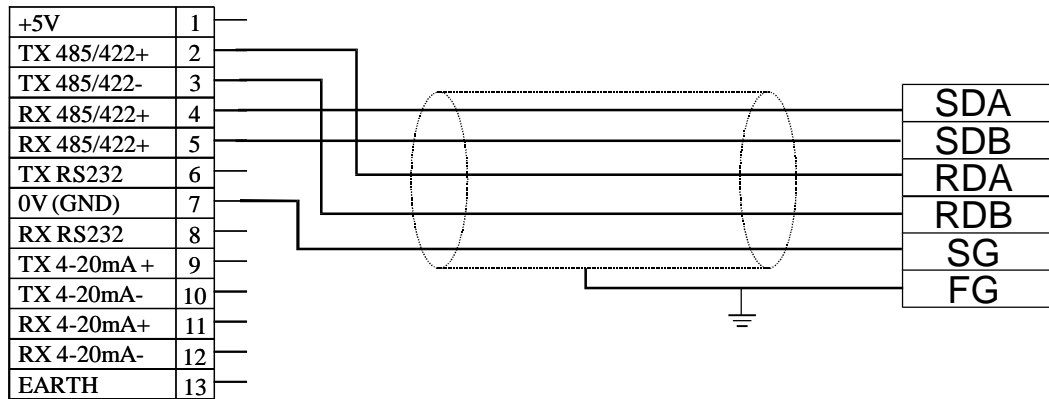
NOTE: Switch 1 and 3 must be used together.



Cable Screened Twisted Multipair Beldon 9503
 One Pair Tx Data
 One Pair Rx Data
 Use third pair for 0V

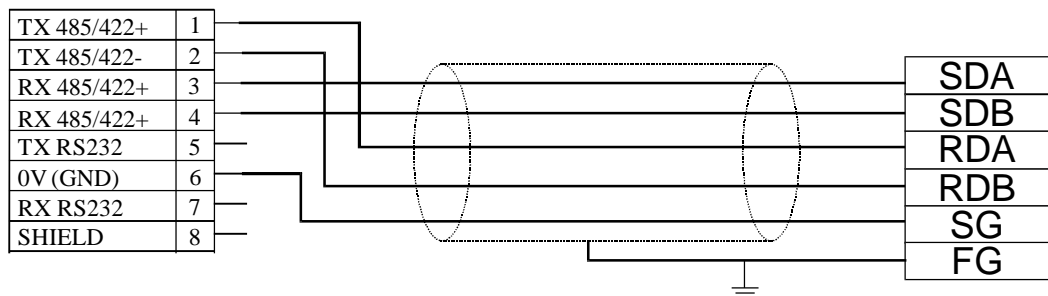
CONNECTING THE OPERATOR STATION TO THE MITSUBISHI AJ71C24

TIU



TIU100/110 TO THE MITSUBISHI AJ71C24

TIU



TIU 50/101/102/111/112/20X TO THE MITSUBISHI AJ71C24

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