GEORGES RENAULT™

TIGHTENING SOLUTIONS

199 route de Clisson
BP 13 627
44 236 Saint Sébastien Sur Loire
France
Tél : 00 33 2 40 80 20 00
Fax : 00 33 2 40 80 20 59

SEQUENCED FASTENING PROCESS

SFP BASIC

Direct Programming with the TWINCVI

Chicago Pneumatic™ Desoutter™ GEORGES RENAULT™

Table of contents

WARNING

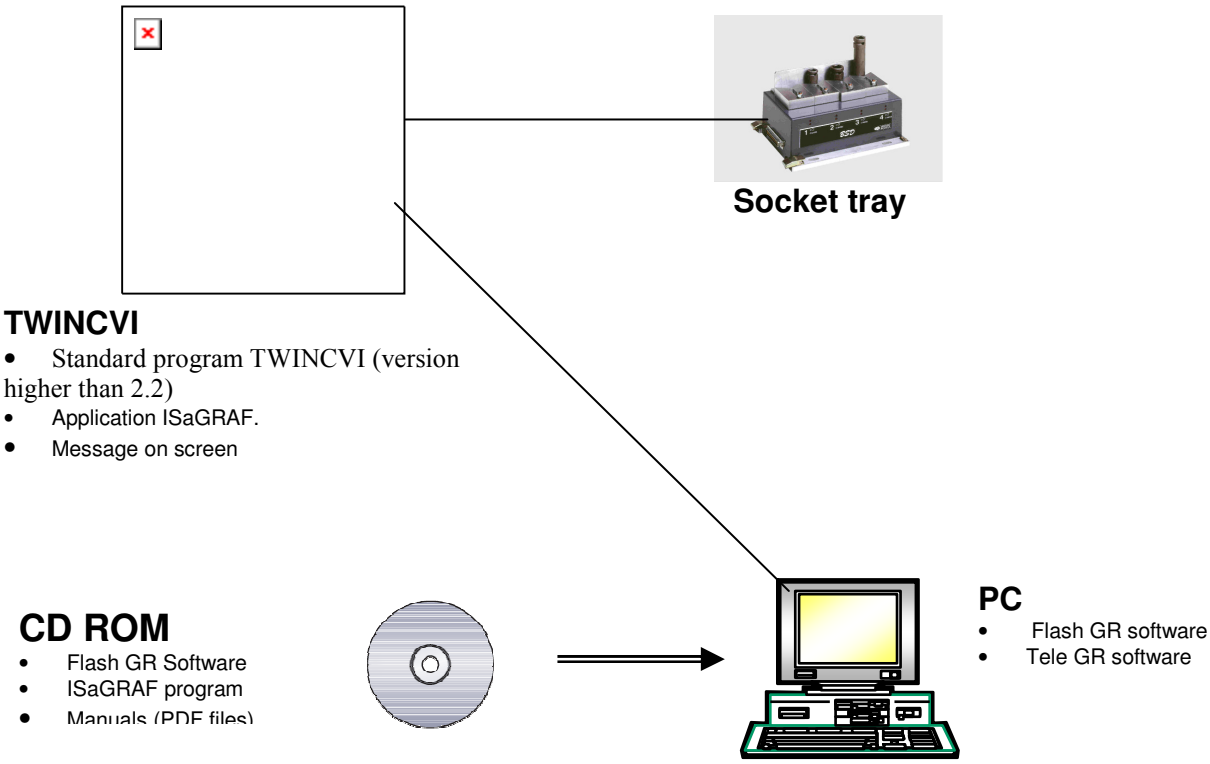
With a view to constantly improving its products, GEORGES RENAULT reserves the right to introduce all the changes as it may deem necessary to the products described herein, without prior notice.

1 INTRODUCTION

This manual describes how to program sequences for the TWINCVI from the ISaGRAF software.

This application offers a complement to the use of the controller and allows the operator to run a sequence of several tightenings at various torques:
- screws of various sizes on the same component.
- when several components are to be assembled by the same operator at various torque values.
- Flexible tightening stations with many fastening points at various torques (both tools can operate in synchronous or asynchronous mode).

2 DESCRIPTION



The application is designed as an ISaGRAF program installed in the tightening controller.
As soon as the application is installed, it is systematically run by the controller
The controller is standard again once the application is erased.
The operator must program a sequence (a sequence consists of several steps) using the TWINCVI keyboard.

When the controller is switched on, the system is ready to start a sequence.

To start a fastening sequence, the operator must press F1

The system runs the programmed fastening sequence.

Once the sequence is over, the system enables the "End of all tightenings OK" output. According to the status of the "Sequence validation" option (enabled or not), the system:

is ready to start a new sequence.
waits for the "Sequence validation" signal to validate operation again.

A cycle can be run several times if the " NcyOK " cycle counter associated to this cycle is higher than 1.

The following options are available:

- Associate the selection of cycles with the selection of sockets, using a socket tray. In this case, the fastening task can be performed only if the operator picks up the socket indicated by the blinking lamp on the socket tray.
- Skip a step of the sequence if it is not possible or necessary to run it.

In synchronous mode (using two spindles simultaneously), the socket tray is managed differently. Indeed, only one socket tray can be connected to the TWINCVI, which is only used to check spindle 1. In this case, the operator is supposed to take up, from another socket tray (not connected to the TWINCVI), the same socket as on the socket tray connected to the TWINCVI.

The language selection is linked to the language selection in the SERVICE \ LANGUAGE menu of the TWINCVI:

- French when French is selected
- German when German is selected
- English when any other language is selected.

3 PHASES TO IMPLEMENT THE APPLICATION

To make the SFP software operational, it is necessary to:

1. Connect the TWINCVI to the PC
2. Install the "teleGR" or "FlashGR" software on the PC
3. Download the ISAGRAF application to the TWINCVI tightening controller
4. Program the parameters of the tightening controller (cycles, station and peripheral menus).
5. Connect the various peripherals to the tightening controller.

4 INSTALLATION OF THE FLASHGR SOFTWARE

4.1 Hardware and Software Requirements

The computer should be PC type (Pentium 75 as a minimum) or compatible, with a RAM of 32Mo available as a minimum and a serial port.

4.2 Software Protection.

The "FlashGR" software is freeware. It can be duplicated on all the stations where its installation is necessary.

4.3 Installation

The software is installed by means of the CD-ROM.

Create a FlashGR file in directory C:\Program Files\GEORGES RENAULT\Sequenced Fastening Process) on the hard disk of your PC.

Insert the CDROM, search directory D:\Sequenced Fastening Process\FlashGR, select the content of the FlashGR file and copy it in the file created.
Select the FlashGR.exe software and double click to start the application.

If the programs are to be installed in Windows NT / Windows 2000, you must use an administrator account.
Using the Windows shortcuts, these programs can be started in various directories. This allows you to define several station sites.

4.4 Upgrading the FlashGR Software

The FlashGR software can be upgraded by overwriting the former version.
Please contact us.
In Windows NT / Windows 2000, you do not need to use an administrator account for upgrading.

4.5 Initiating the Program

In directory C:\Program Files\GEORGES RENAULT\FlashGR. select the FlashGR.exe software and double click to start the application.

You can access the menus/buttons directly from the keyboard (without using the mouse) by using the Alt key and the shortcut key (underlined letter of the menu or button).
The Tab key allows you to scroll forward through the menus/windows.
Pressing simultaneously the Shift+Tab keys allows you to scroll backward.

4.6 Selecting a Language

You can change the language for the menus and dialog boxes by selecting it in the list.
To do so, go to the "Parameters" menu, then to the "Language" menu: two languages are currently available:
- French
- English

Select your language and validate.

5 DOWNLOADING THE ISaGRAF APPLICATION TO THE TWINCVI

Connect the TWINCVI RSPC connector to the COM1 port on the PC via PC cable PN 6159170470
The application can be installed in two different ways: either from a diskette containing the "teleGR" object program or from the "FlashGR" software.
The programs must be installed on the PC hard disk to operate (creating temporary files).
The TWINCVI must contain a software version higher than or equal to 2.2 (for screen management).

5.1 Downloading from the "teleGR" Software

- With the TWINCVI controller switched off
- Click on Install
- Switch on the controller.
- A bar indicator shows the progression of the downloading of the application to the controller.
- As soon as the downloading is over, the controller is ready to receive the programming of the sequence of cycles.

5.2 Downloading from the "FlashGR" Software

- With the TWINCVI controller switched off
- Open the "FlashGR" software
- Click on the "Grafcet" button. Using the "Search" command, select the file ‘appli.x6m’ in directory:
  - AUTSFPBA10 / Downloading the Isagraf program… (for station in asynchronous mode)
  - AUTSFPBS10 / Downloading the Isagraf program… (for station in synchronous mode)
- Open
- Validate
- Switch on the controller; the "Download" and "Upload" buttons are now enabled.
- Click on "Download"
- A bar indicator shows the progression of the downloading of the application to the controller (a few seconds).
- As soon as the downloading is over, the controller is ready to receive the programming of the sequence of cycles.

The name of the ISAGRAF application now appears in the bottom left-hand corner of the TWINCVI’ main menu.

"SE_AS_#" program: This program controls a dual-spindle or single-spindle tightening controller, configured in asynchronous mode. Ref. GR “AUTSFPBA10”
"SE_SY_#” program: This program controls a dual-spindle or single-spindle tightening controller, configured in synchronous mode. In this configuration, 2 spindles are used simultaneously. . Ref. GR “AUTSFPBS10”

Rq: # corresponds to a letter which indicates the program version.

6 PROGRAMMING

Access to the programming of the sequences is automatic immediately after installing the application.

6.1 Programming a Sequence

When the programming screen of the sequence is enabled, several fields are displayed:

Field	Definition
Station	This field displays the selected station number. At any time, the operator can switch from station number 1 to station number 2, by pressing function key F3 (in asynchronous mode only)
Cycle	Acquisition field for cycle number. Enter or change cycle number for the step concerned
Socket	Acquisition field for socket number on socket tray. If no value is entered, no socket selection is enabled.
List	This field includes all the steps already stored for the selected spindle. In this field, you can find the step number, the cycle number and the socket number.

Press F10 to validate each step of the sequence.

The data is saved even when the TWINCVI controller is switched off.
After completing the programming, press function key F1 to exit this screen and enable the tightening programs.
It is also possible to change the data of a step by selecting it in the list field, to fill the acquisition fields and to press F10 to validate your changes.

Keys and functions available from this menu:

Key	Function
F1	Starts the fastening sequence / Allows to access the programming of the sequence
F2	Resets the data saved.
F3	Allows you to switch from station to station.
F8	Allows you to display the description of cycles and sockets at any time.
F10	Validates and saves each step of the sequence.

The following functions are available from the description menu of cycles and sockets (access by pressing F8).
These keys can be accessed only if the TWINCVI access code is unlocked.(see § Locking the data)

Key	Function
F1	Allows you to skip a stage for spindle 1 (this command is equivalent to the "Skip a step" input / spindle 28 of channel 1 connector).
F2	Allows you to skip a stage for spindle 2 (this command is equivalent to the "Skip a step" input / spindle 28 of channel 2 connector). (in asynchronous mode only)
F5	Allows you to modify the sequence.
F6	Allows you to enable or disable the following options: End of sequence validation. Skip a step validation.

6.2 Programming Options / Miscellaneous Functions

6.2.1 End of sequence

To inform the operator that the fastening sequence is completed, a signal can be associated to each tool to indicate the end of sequence. This signal can be of visual or sound type ("End of all tightenings OK" output / pin 5 of connector).

6.2.2 End of sequence validation.

To be allowed to use this functionality, the "End of sequence validation" option must be enabled.
When the fastening sequence is completed, a validation signal must be sent to the controller to start a new sequence ("End of sequence validation" input / spindle 37 of connector).
This signal may be generated by:

A push-button which must be pressed by the operator.

The detection of the next part by an appropriate detection system.

6.2.3 Skip a Step

To be allowed to use this functionality, the "Skip a step" option must be enabled.
If for one reason or another an action cannot be performed (missing part, for example), then you can skip to the next action in the table by means of an external command. This external command can be, for example, a pushbutton connected to the TWINCVI (">Skip a Step" input / pin 28 of connector).
Warning: If you do not use this functionality, no stage can be skipped, even in the event of incorrect fastening.

6.2.4 Resetting

If the operator wants to re-start from the very first stage of the sequence table, it is possible to reset the sequence table to the 1st step by means of an external command. This external command can be, for example, a pushbutton connected to the TWINCVI ("Reset" input / pin 36 of connector)

7 LOCKING THE DATA

The data is protected by the same code which locks all the TWINCVI parameters. When the password is enabled, you can display the sequence of channel 1 and channel 2 by pressing F8, but the F1, F2, F5 and F6 keys are not available.
The access code of the TWINCVI is available through the "Service" menu, then the "access code".

8 SET-UP THE TWINCVI

To be allowed to use the programmed sequences, you must set-up the TWINCVI with the following parameters.

8.1 Asynchronous Mode

8.1.1 Inputs / Outputs

Channel 1

Input	Pin no	Description
1	24	Allocated for the socket tray
2	25	
3	27	
4	29	
5	31	
6	32	Start cycle
7	33	Run reverse
8	34	Manual mode
9	NC	Emergency stop
10	36	Reset
11	26	Error acknowledgement
12	28	Skip a Step
13	30	
14	37	End of sequence validation spindle 1

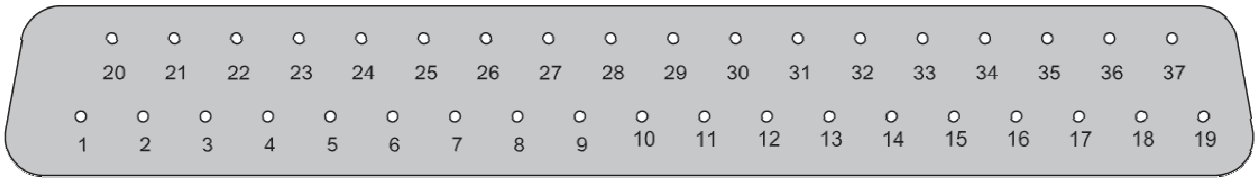
Output	Pin no	Description
1	15	Allocated for the socket tray.
2	13	
3	11	
4	9	
5	8	
6	7	Accept spindle report
7	6	Reject spindle report
8	5	End all tightenings OK
9	3	In cycle
10	2	Ready
11	18	
12	19	
13	14	End of sequence (NcycOK)
14	12	
15	10	
16	35	

Channel 2

Input	Pin no	Description
1	24	Allocated for the socket tray
2	25	
3	27	
4	29	
5	31	
6	32	Start cycle
7	33	Run reverse
8	34	
9	NC	Emergency stop
10	36	Reset
11	26	Error acknowledgement
12	28	Skip a Step
13	30	
14	37	End of sequence validation spindle 2

Output	Pin no	Description
1	15	Allocated for the socket tray.
2	13	
3	11	
4	9	
5	8	
6	7	Accept spindle report
7	6	Reject spindle report
8	5	End all tightenings OK
9	3	In cycle
10	2	Ready
11	18	
12	19	
13	14	End of sequence (NcycOK)
14	12	
15	10	
16	35	

Connector SubD 37 female pins (TWINCVI side) :



8.1.2 Serial ports

RSA : unused.
RSB: unused.
RSPC: Uploading to PC: RS232; 115 200 bauds; 8 bits; 1 stop; no parity.

8.1.3 Station parameters

Mode	Asynchronous
Torque unit	Nm
Cycle source	I/O
Spindle validation	I/O
Error acknowledgement	Available
SCY pulse	No
Correct spindle	No
Lock on Ncycle OK	No
Spindle validation in run-reverse	Available

Rq: In manual mode with spindle validation parameter in I/O mode, inputs 12 (pin 28) of both channel should be setting ON in order to enable the 2 spindles

8.2 Synchronous mode

8.2.1 Inputs / Outputs

Channel 1

Input	Pin no	Description
1	24	Allocated for the socket tray
2	25	
3	27	
4	29	
5	31	
6	32	Start cycle
7	33	Run reverse
8	34	Manual mode
9	NC	Emergency stop
10	36	Reset
11	26	Error acknowledgement
12	28	Skip a Step
13	30	
14	37	End of sequence validation spindle 1

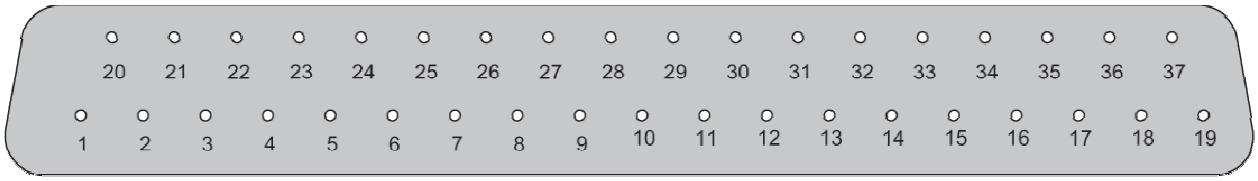
Output	Pin no	Description
1	15	Allocated for the socket tray.
2	13	
3	11	
4	9	
5	8	
6	7	Accept spindle report
7	6	Reject spindle report
8	5	End all tightenings OK
9	3	In cycle
10	2	Ready
11	18	
12	19	
13	14	End of sequence (NcycOK)
14	12	
15	10	
16	35	

Channel 2

Input	Pin no	Description
Not used		

Output	Pin no	Description
1	15	Accept report spindle 1
2	13	Accept report spindle 2
3	11	Reject report spindle 1
4	9	Reject report spindle 2

Connector SubD 37 female pins (TWINCVI side) :



8.2.2 Serial ports

RSA: unused.
RSB: unused.
RSPC: Uploading to PC: RS232; 115 200 bauds; 8 bits; 1 stop; no parity.

8.2.3 Station Parameter

Mode	Synchronous
Torque unit	Nm
Cycle source	I/O
Spindle validation	I/O
Error acknowledgement	Available
SCY pulse	No
Correct spindle	No
Lock on Ncycle OK	No
Spindle validation in run-reverse	Available

Rq: In manual mode with spindle validation parameter in I/O mode, inputs 12 (pin 28) of both channel should be setting ON in order to enable the 2 spindles.

9 OPERATOR'S MESSAGES

The TWINCVI must contain a software version higher than or equal to 2.2 (for screen management).

The application allows you to display messages for the operator on the step number.
The standard screen of the TWINCVI controller does not display these messages but it is possible to add them using the "FlashGR" software.
- Connect the PC port of the TWINCVI to the COM1 port of the PC.
- Open "FlashGR"
- Switch off the controller then switch it on; the "Download" and "Upload" buttons are now enabled.
- Click on "Upload"
- Check the "Screens" option and validate.
- Click on the "Screens" button
- Select the screen in which you want to display the message.

For asynchronous operation, select one of the 3 tabs "Async 1; Async 2; Async 3".
For synchronous operation, select one of the 3 other tabs "Sync 1; Sync 2; Sync 3".
- Click with the right-hand button of the mouse to display the option menus
- Select "First station" then "ISaGRAF Message" to insert the message linked to channel 1.
- A message simulation is displayed on the screen. Position it in the desired place, in the area allocated to channel 1.
- Repeat steps for channel 2 if required
- After performing your modifications, click on "Validate".
- Determine the name of the new file and save it by clicking on "Save".

The name of the file must begin with the letters cae.
For example: cae rework.bin
- Click on "Download" to finish the operation by downloading this new screen option file to the TWINCVI.

10 OPERATION

Once the sequence table has been formatted correctly in the TWINCVI and the various pieces of equipment have been connected to the TWINCVI (screwdrivers, socket tray, etc.), the system is ready to operate.
When the controller is switched on, the system is ready to start a sequence.
To start a fastening sequence, press F1
The system runs the programmed fastening sequence.
Once the sequence is over, the system enables the "End of all tightenings OK" output. According to the status of the "Sequence validation" option (enabled or not), the system:

is ready to start a new sequence.
waits for the "Sequence validation" signal to validate operation again.

At any time, the operator can be informed of the sequence process status. When he/she presses the function key "F8" on the TWINCVI, the sequence, cycle number and socket number are displayed on the TWINCVI screen.

11 BACK TO "STANDARD" TWINCVI

11.1 Erase ISaGRAF application

To go back to a standard TWINCVI controller, you must clear the "grafcet", i.e. the ISaGRAF application which runs the sequence of cycles. This task is performed with the "FlashGR" software, using the "Erase grafcet.bat" file.

11.2 Manual mode

In order to run the TWINCVI in Manual mode without clearing the ISaGRAF application, it is possible to connect a standard switch on input 8 (pin 5) of channel 1 of the TWINCVI.

In this configuration, the I/O come back to their initial meaning:

- Output 8 (pin 5): 'End all tightenings OK' becomes standard NcycOK
- Input 12 (pin 28): 'Skip a Step' becomes standard 'Spindle validation'
-

As soon as you switch off the manual mode, you come back to the beginning of the ISaGRAF program.

----------End----------