SINUMERIK 840D sl, NCU system software for 6 axes)		6FC5840-1XG10-6YA0
with HMI Embedded, in 6 languages, on CF card; with license)	Export	6FC5840-1YG10-6YA0
SINUMERIK 840D sl, NCU system software, 31 axes)		6FC5840-3XG10-6YA0
with HMI Embedded, in 6 languages, on CF card; with license)	Export	6FC5840-3YG10-6YA0
SINUMERIK 840D sl, NCU system software, 6/31 axes)		6FC5840-3XG10-6YA8
with HMI Embedded, in 6 languages, on CF card; without license)	Export	6FC5840-3YC10-6YA8

Information about installing and operating the software on SINUMERIK NCU 710.1, NCU 710.2, NCU 720.1, NCU 720.2, NCU 730.1, NCU 730.2.

Changes in HF5 as compated with NCU-SW 1.5 HF4:
HF5 (internal version 01.05.00.05.002) consists of the following modified components:

- NCK-Software V72.05.01
- SINAMICS-Software V02.50.44.00
- LinuxBase V02.50.24.01

The NCU software 1.5 HF4 (internal version 01.05.00.04.002) consists of the following components:

- LinuxBase (NCU) V02.50.24.00
- NCK software V72.05.00
- PLC OpSys V20.70.36 (PLC 317)
- PLC FB15 V01.05.05
- CP V01.32.06
- MCP Client V01.04.23
- SINAMICS software V02.50.43.00
- HMI Embedded V07.50.15.00
- Technology Cycles V07.05.05
- Measuring Cycles V07.05.03
- Cycles ISO Compatibility V06.05.02
- Adapting Cycles V07.01.09

1. Installing the NCU software:
For installing the NCU software you will need the NCU service system V02.50.21 or higher on USB stick.
New installation can only be performed either using the NCU Service System and TCU with keyboard or WinSCP. Installations without full keyboard or WinSCP can only be performed using an USB stick that has been prepared for automatic upgrade (cf. General information).
The software may only be Installed on a SanDisk CompactFlash 5000 1GB. MLFB / order no. for the empty card: 6FC5313-5AG00-0AA0.

1.1 Installing the NCU service systems on USB stick:
The NCU service system is located as a USB stick image in the emergency_bootsys_ncu directory on the supplied DVD. The installdisk.exe copy routine is located in the same location. Connect a 512MB or 1GB USB stick, recommended type Siemens 6ES7648-0DCx0-0AA0, to your programmer ("PG") or PC (with Windows XP) and note down the letter of the drive to which the stick is connected. Run the installdisk routine to copy the NCU service system to the USB stick:
installdisk --verbose --blocksize 1m <image file> <drive letter:>
Example:
(-- means 2x minus sign)
installdisk --verbose --blocksize 1m D:\ emergency_bootsys_ncu\linuxbase-512M.img X:

or

installdisk --verbose --blocksize 1m D:\ emergency_bootsys_ncu\linuxbase-resize.img X:
(When using the ...resize.img, reboot the NCU once from USB stick in order to unpack the image on the stick).

It is best to copy the image in a DOS shell.
To this end, you will need administrator rights on your PG/PC.
After completion of installdisk, remove the USB stick from your PG / PC and insert it again. Under Windows, you will now see an empty USB stick. Now copy the desired NCU software (file with ".tgz extension) from the supplied DVD, ncu_sw directory to your USB stick.
You may insert the USB stick into one of the two USB ports on the NCU 7x0. When the NCU is turned on, it will boot from this USB stick. The operation is always performed via a TCU connected to the NCU, or via PG / PC using WinSCP with "Open Terminal".
For a description of the operation of the NCU service system, please refer to the /IM7/ Documentation on the supplied DVD.

1.2 Upgrading an NCU 7x0 with NCU software, version 1.5 and higher

With an upgrade, all user data on the CF card in the directories /user, /addon, /oem, and the license key are maintained. For the upgrade of systems equipped with several NCUs / PCU50, please refer to Section 7 "Networking".

- Boot the NCU from your USB stick (see 1.1).
- Select the Service Shell using F2 / F3.
- Log in with user name "manufact". This may require an external keyboard, since user names must be written in lower case letters.
- Enter the following command after the operator prompt $ in the service shell:
  sc restore -update /data/<ncu-sw>.tgz
  The software update is completed when prompt $ is displayed again.
- Remove the USB stick.
- Boot the NCU (POWER OFF / ON).
- Now you can start up the PLC, drives and NC.

1.2.1 Upgrade using WinSCP

Systems without TCU at the NCU can be upgraded with WinSCP, for example on a PCU 50. For this purpose, log on at the NCU with WinSCP as "manufact" and copy the required NCU software (file with extension .tgz) from the ncu_sw directory on the supplied DVD to /card/user/system/home/manufact on the NCU. Then enter the following command under "Commands / Open Terminal":
sc restore -update -force <ncu-sw>.tgz
The software is installed when the "Syncing disks .... done" message is displayed. Afterwards, the NCU must be rebooted. The <ncu-sw>.tgz file on the NCU should be deleted.
Note: During the installation, messages may be displayed claiming that the communication partner has not reacted for some time. You can ignore these messages, but please do not cut the connection in this case.

1.3 New installation on the CompactFlash Card or upgrading from SW 1.3, SW 1.4 to Software Version 1.5

IMPORTANT: This procedure completely deletes anything existing on the CompactFlash Card; this applies to an empty CompactFlash Card as well.

- Boot the NCU from your USB stick (see 1.1).
- Select the Service Shell using F2 / F3.
- Log in with user name "manufact"; when the CompactFlash Card is empty; use "admin", password "SUNRISE" instead. This may require an external keyboard, since user names must be written in lower case letters.
- Enter the following command after the operator prompt $ in the service shell:
  sc restore -full /data/<ncu-sw>.tgz
  The software update is completed when prompt $ is displayed again.

- Remove the USB stick.
- Boot the NCU (POWER OFF / ON).
- When the system is started with TCU(s) for the first time, the TCU(s) must be logged on to the system. Enter the TCU name (default TCUx) and the address of an assigned MCP.
- In case of interconnected systems, you may have to activate the firewall (cf. General information).
- Now you can start up the PLC, drives and NC.

2. New functions in NCK 72.00.00 (or later)

- In machine data $MN_ASUP_EDITABLE, the machine manufacturer can set whether the Siemens system ASUP from _N_CST_DIR or a user ASUP from _N_CUS_DIR (_N_CMA_DIR) shall be executed for RET or REPOS events.
- ET200S-F I/Os are supported for Safety Integrated.
- GETFREELOC can be called up several times during empty location search in the tool management.
- The machine data $MA_JOG_AND_POS_MAX_JERK[axis] is now active with NEWCONF.
- The couplings TRAIL, LEAD and ELG are implemented for (BCS) and (MCS).
- Fixed-point approach in JOG: Max. four fixed points can be defined via the machine data $MA_FIX_POINT_POS[]. The number of valid fixed points is determined via the machine data 30610 $MA_NUM_FIX_POINT_POS.
  Approach procedure:
  - Select JOG mode
  - Activate via PLC interface (see 4.3)
  - Traverse axis using axis key (continuous resp. incremental) or handwheel until it stops automatically. The axis stops at the defined fixed point without emitting an alarm message.
- The number of possible parameterizable transformations has been extended from 10 to 20.
- Generic transformation has been extended to include a 7th axis.
- The nesting depth of subprograms and control structures has been increased from 8 to 16.
- The current axial setpoint and actual braking path can be read using system variables.
  Basic coordinate system:

$AA_DTBREB[AX]	Total braking path
$AA_DTBREB_CMD[AX]	Path – single interpolator
$AA_DTBREB_CORR[AX]	Overlaid movements
$AA_DTBREB_DEP[AX]	Coupled axis

  Machine coordinate system:
  $AA_DTBREM[AX]
  $AA_DTBREM_CMD[AX]
  $AA_DTBREM_CORR[AX]
  $AA_DTBREM_DEP[AX]
- The number of safe cams (SN) has been increased to 30 with solution line.
- Empty location search within turret magazines can be performed using the same setting options as for chain magazines.
- The program attribute ACTBLOCNO is used to output the block number from the current block containing the alarm upon alarm output with active DISPLOF.
- Machine data $mc_ign_prog_state_asup defines whether the display of the ASUP name shall be suppressed. The ASUP is performed “silently“.
- The function Any–Asup–Active sets the new channel-specific VDI signal “anyAsupActive“ in DB.[channel].DBX378.0.
  The new channel-specific VDI signal “silentAsupActive“ is set in DB.[channel].DBX378 if an ASUP is performed silently.
- Interruptability of ASUPs:
  Certain Prog-Events shall not be prevented or stopped by VDI signal NC Stop DB[channel].DBX 7.3). This ensures that the Prog-Event is executed completely independently of the VDI signal.
  The VDI signals NC Stop at the block end DB[channel].DBX 7.2, NC Stop “Axes plus spindle” DB[channel].DBX 7.4 are discarded accordingly.
  The function is activated by the bit-coded machine data $MC_PROG_EVENT_IGN_STOP for any Prog-Events.

- The subprogram return RET(...) allows you to return to a block number or label of the calling program. This function has been extended such that you can also specify any string as return target.
- Time monitoring on synchronous spindles:
  When reaching setpoint-side synchronization, two time windows are initialized which are used to monitor the time span until actual value-side coarse resp. fine synchronization is reached.
  The size of the time windows is taken from MD 37240 $MA_COUP_SYNC_DELAY_TIME[0/1].
  Index 0 for fine synchronization and Index 1 for coarse synchronization. The value of zero deactivates the respective monitoring mode. If actual value-side coarse/fine synchronization is not reached before the relevant time window has expired, Alarm 22018 is output.

3. General information:

- After the new installation of NCU software 1.5 on a CompactFlash card, a general reset of the NCU and PLC must be performed: Turn the SIM / NCK switch to position 1, the PLC switch to position 3 and perform a POWER ON.
- NCU710 / NCU720: The PLC program must initiate an immediate (approx. 20 secs) reaction to alarm "2120 NCK fan alarm" by stopping the axes in a controlled manner.
- NCU730: The PLC program must initiate an immediate (approx. 20 secs) reaction to alarm "2120 NCK fan alarm" by stopping the axes in a controlled manner if **no** double-fan module is used.
- NCU710 / NCU720: The NCU will not power up if a fan module is not installed or if the fan is defective. This applies for NCU 730 with double fan module only in the case of failure of both fans.
- Alarm 15122 "%1 data have been restored, of which %2 machine data, %3 error"
  If %3 indicates that more than zero errors have occurred, it is not advisable to continue working with the data. To avoid further problems, you should read in an up-to-date backup copy of the data.
- Alarm 8024: If more than three tool magazines are set via machine data, these must be activated via Options.
- It is not always possible to port an NCK series startup file from 840D powerline without processing to 840D sl.
- Prior to overwriting a licensed CF card, a backup of the license key is absolutely necessary The key is available in file ‘keys.txt’ and is stored under the path *card/keys/sinumerik*
  The backup of the key can be carried out, for example, with WinSCP, by the PG / PC.
- Each license is assigned to a specific CompactFlash card (card ID) and is only valid on the assigned card.
- Mini handheld unit
  An additional hardware is now required to operate a mini handheld with handwheel. As previously, the inputs are connected directly to the PLC I/Os or can alternatively be integrated into the input image of the MCP IE (X51…) using a relevant connection kit. For transmitting the handwheel signals, a machine control panel (Ethernet or PROFIBUS) or a handwheel PROFIBUS connection module is now required as for the type MPI handheld unit.
- Data backups should be read in in the order NC, PL, drive. It will therefore make sense to create the NC, PLC and drive archives separately.
- Contour handwheel and speed override using a handwheel are only release with Profibus MCP.
- The RESET button on the NCU can be used to restart the NCU module. It is not ensured that this will also ensure a restart of the whole system in all configurations. This also applies for the PI service of PLC with FB4.
- The catalog /siemens/system/etc. contains a template for the current standard basesys.ini.
- With interconnected systems, we recommend to assign names to the individual stations in the basesys.ini (e.g. host name=NCU-2).
- If you wish to interconnect systems, the entry “SyncModeDHCPD_SysNet=ON_MASTER” in the basesys.ini must be declared a comment before networking the DHCP master. Power-up sequence when starting up the system for the first time after being interconnected: DHCP master (so far DHCP server), then all other stations.
- By default, Port 102 on X130 is blocked. If you wish to access the controller via X130 using STEP 7 or HMI, you have to activate Port 102.
  This can be achieved using the following entry in the file /user/system/etc/basesys.ini:
  [LinuxBase]
  FirewallOpenPorts=TCP/102

If required, you can also activate the Port 5900 for the VNC Viewer.

- The HT2 Ethernet handwheel is configured at the fifth handwheel interface.
  Example for three Ethernet handwheels. The third handwheel is located in HT2:

MD11350[0]=7	11351[0]=1	11352[0]=1
MD11350[1]=7	11351[1]=1	11352[1]=2
MD11350[2]=7	11351[2]=1	11352[2]=5

- HT2: The PLC application example for the HHU included with the Power Line toolbox cannot be transferred to the HT2 without several changes. The NCVAR variable descriptions must be adapted accordingly.
  FC13 now supports the visualization of four lines. As a result, the meaning of the “ROW“ parameter has changed as follows:

  0 = No display output
  1 = 1st line
  2 = 2nd line
  3 = Line 1 and line 2 alternately
  4 = 3rd line
  5 = Line 1 and line 3 alternately
  8 = 4th line
  F = Automatic change of all lines

  The display contents must be stored in the field “ChrArray“type string[64].
  The upper four keys are transferred to the PLC input image
  (the LEDs under these keys cannot yet be addressed).

  Sample parameter setting for the HT2 at FB1 (OB100):

```
BHG             :=5
BHGIn           :=DB100.BhgIn_170
BHGOut          :=DB100.BhgOut_150
BHGStatSend     :=DB100.DBD80
BHGStatRec      :=DB100.DBD84
BHGInLen        :=
BHGOutLen       :=
BHGTimeout      :=
BHGCycl         :=
BHGRecGDNo      :=2 // corresponds to the setting of the rotary switches * of the terminal box resp. MPP.
BHGRecGBZNo     :=2 // corresponds to the setting of the rotary switches * of the terminal box resp. MPP.
BHGRecObjNo     :=1
BHGSendGDNo     :=2
BHGSendGBZNo    :=1
BHGSendObjNo    :=1
BHGMPI
BHGStop
BHGNotSend
```

  * The rotary switches S1 and S2 at the terminal box resp. MPP determine the DIP number used to register the node in the system (here, S1=0, S2=2).

- Alarm 46xx: The machine data for the Ethernet handwheel must be checked.
  Example for the first handwheel: MD11350[0]=7, 11351[0]=1, 11352[0]=1

- Combinations of NCUs with Sinamics Sxxx CUs have not been released.

- Spindle traversing with limited torque (Focon) or spindle traversing to fixed stop:
  The performance display at the HMI is calculated as 100% of the limited torque and output.

- Automatic upgrade using a bootable USB stick:
  Automatic “update -restore“ or “update -full“ can be performed using an accordingly prepared USB stick >= 1GB. For this, copy a script (autoexec.sh) and the NCU software onto the stick. The script name

must not be changed. The NCU software copied onto the stick must be renamed into update.tgz or full.tgz. Then, set the rotary switch SIM/NCK on the NCU to position 7 and boot the NCU from the stick. The script can only be executed when the switch is in position 7. Otherwise, the system is booted from the stick and branched into the service menu. On the basis of the NCU software designation, the script decides whether to perform “restore -update“ or “restore -full“. In addition, the script performs a data backup of the CF card before restoring. The progress of the individual script steps can be monitored at the 7-segment display resp. the internal HMI. The exact meaning of the displays and individual steps is described in a separate document. The script is stored on the delivery DVD.

- With NCK V67.05.03 or later and ADI4 board V01.04.04, the ADI4 board can be operated on 840D sl with internal PLC 317.
- As before, Dbsi 1 is not released for SINUMERIK and integrated drive control.
- NCU Bios V1.4 (or later) is required to operate CompactFlashCards 1GB in a NCU730.

4. Information about the NCK:

- If the number of part programs set via machine data nearly corresponds to the number of actually existing part programs, the value in the machine data must be increased (due to additional cycles).
- The interpolatory traversing of positioning axes is canceled with alarm 8031 “...Axis has not IPO functionality.“
- SPI and PW have (already always) been keywords and cannot be used as axis identifiers.
- The G643 function (block-internal smoothing) has been released for applications in the tool change area (e.g. optimizations for approaching the tool change position). The function has not been released for applications in the machining process.
- The G644 function (block-internal smoothing) has been released for applications in the tool change area (e.g. optimizations for approaching the tool change position). The function has not been released for applications in the machining process.
- Software variant for a max. of six axes: The default setting for the number of axes is 3.
- The "Extended measurement" function with distributed measuring input on the SINAMICS modules is not available (MEAC, MEASA, MEAWA).
- Gaps in the channel sequence are not permitted in systems with a maximum of two channels.
- Access to drive data via $nn_nn system variables is not enabled. The only available system variables are those transferred in telegram 116.
- Extended stop and retract (ESR) has not been enabled.
- ASUBs can now be started along the line of the 840Di functionality via the PROFIBUS PLC I/Os. Machine data settings must be selected by the same method used on the 840Di system. There are no high-speed NCK I/Os mapped in DB10 of the PLC. However, the ASUB start options used in earlier versions (i.e. from DB10 or FC9 via PLC program) are still available.
- High-speed ET200 Simatic modules can be used as a replacement for the DMP modules used on Powerline. For this, you can operate one of the two PROFIBUS lines in synchronism with the clock with PLC317 in combination with NCK V 67.07.05 or later (more details are provided in a separate description).
- With a 31-axis software on an NCU 710.1, you can use six out of 31 axes and four out of ten channels.
- Machine data 10008 $MN_MAXNUM_PLC_CTRL_AXES is no longer included in the data record. It has been replaced by MD19160.
- MD 10062 $mn_posctrl_cycle_delay must be zero. Check the available data backup.
- Machine data 32250 $ma_rated_outval[ ] must have value zero.
- IMD (integrated monitoring & diagnostic) :
  Feedback in GUD variable _PM_MISSING_TOOL_REFRESH after writing the variables to "1" is updated only after image change.
- Safety: There is a new option handling referring to synchronized actions or synchronized action elements. Up to version 1.3 (NCK 62), synchronized action level 2 was set automatically at the same time with option SI. Thus, channel MD 28250, NUM_SYNC_ELEMENTS could be set to a value > 159. This has been changed with NCK version 67. Synchronized action level 2 is no longer included in Safety. Instead there is a new machine data, in which the synchronized action elements for SAFE.SPF are defined, i.e. MD 28251, NUM_SAFE_SYNC_ELEMENTS.
  This machine data can be written with max. value 500 for option SLP_I_O=1, and with a max. value of 5000 for option SPL_I_O=2.

However, the number of synchronized action elements required should be determined in order to prevent the performance from being loaded unnecessarily.
With system variable $AC_SAFE_SYNAC_MEM, the relevant number of free SI synchronized action elements can be read.
If this variable is called prior to starting and after running SAFE.SPF, the difference is the number of elements occupied by SAFE.SPF. This difference adding a certain reserve should be entered in MD 28251.
Index 1-5 must be indicated when writing MD 35300 via synchronized actions.

- Safety: Changed check sums of Safety integrated into the drive.
  The check sum for these functions must be confirmed again due to new drive-integrated safety functions.
  To this end, enter “95” (safety start-up) in parameter p10.
  Subsequently, copy the parameters of the current check sum to the parameters of the target check sum.
  p9798 to p9799
  p9898 to p9899
  Subsequently, p10 must be set to zero again. This will automatically save the values (p971=1 is set).
  Wait for the process of saving to be completed.
  The processes mentioned above can also be triggered in HMI Advanced under IBN/NC/Safety Integrated using the softkeys "Activate start-up mode" and "Deactivate start-up mode".
- With Software Version 1.5 HF2 / 2.4 SP1 or later, the HT2 can be used as handheld unit.
- The auxiliary function M6 is no longer output as standard after block search.
  Remedy:
  Change the auxiliary function group in MD 22040 $mc_auxfu_predef_group[5] into an unassigned group.
- If the value of MD18210 deviates from the default, MD18210 must be increased by min. 21 MB DRAM to upgrade the system from SW1.4 / 2.4 to SW1.5 HF4 / 2.5 HF1.
- SinuComNC is not released for 840D sl, Software Version 1.5 HF 4 and NCU sl 2.5 HF 1. This does no longer apply for 1.5 HF5 resp. 2.5 HF2.
- The dynamic group function G commands “DYNNORM / DYNPOS etc.“ has not been released.

- Enhanced functions and further developments:

NCK 70.00.00	AP00307789	AP00307834	AP00307940	AP00313807
AP00332345	AP00347714	AP00348433	AP00350394	AP00352743
AP00362836	AP00364467	AP00371167	AP00375145	AP00375282
AP00391176	AP00392805	AP00394325	AP00394941	AP00395090
AP00399337	AP00399632	AP00404401	AP00405056	AP00405407
AP00405840	AP00405982.	AP00407107	AP00407116	AP00407125
AP00407168	AP00407767	AP00408632	AP00408669	AP00408850
AP00412529	AP00413217	AP00414027	AP00414353	AP00414357
AP00414682	AP00414907	AP00415149	AP00416077	AP00418119
AP00419253	AP00420047	AP00421803	AP00424105	AP00427096
AP00428313	AP00428561	AP00428690	AP00429502	AP00431553
AP00431711	AP00434127	AP00438050	AP00439073	AP00443266
AP00447408	AP00448328	AP00452727	AP00461236	AP00499016

NCK 71.00.00	AP00306965	AP00307787	AP00307984	AP00308017
AP00371866	AP00378695	AP00383031	AP00395538	AP00401184
AP00404178	AP00414760	AP00417001	AP00421581	AP00422102
AP00425628	AP00426130	AP00426156	AP00426503	AP00430483
AP00433538	AP00451079	AP00451783	AP00451923	AP00452522
AP00457473	AP00457972	AP00457973	AP00457977	AP00457980
AP00459600	AP00461681	AP00461904	AP00464368	AP00464489
AP00466333	AP00467126	AP00468502	AP00469818	AP00471166
AP00472978	AP00473536	AP00473571	AP00474051	AP00476691
AP00477241	AP00477266	AP00479474	AP00479879	AP00479986

AP00480247	AP00480712	AP00481472	AP00481717	AP00481859
AP00483328	AP00483891	AP00484085	AP00485367	AP00486453
AP00490696	AP00490874	AP00491618	AP00491954	AP00493097
AP00494018	AP00494582	AP00501056	AP00501068	AP00501097
AP00521875				

NCK 72.00.00	AP00306969	AP00307072	AP00308023	AP00308433
AP00313944	AP00324160	AP00324752	AP00343468	AP00345040
AP00347260	AP00363854	AP00367468	AP00368155	AP00368478
AP00370275	AP00374278	AP00375425	AP00379998	AP00383392
AP00384008	AP00390368	AP00394498	AP00402018	AP00432294
AP00432334	AP00433603	AP00440856	AP00443739	AP00443982
AP00447541	AP00451027	AP00455048	AP00456160	AP00456794
AP00466543	AP00467734	AP00469062	AP00469188	AP00470399
AP00474775	AP00475114	AP00478145	AP00480090	AP00485058
AP00485687	AP00490106	AP00491529	AP00494204	AP00495606
AP00496005	AP00496144	AP00496153	AP00497040	AP00497704
AP00498224	AP00500708	AP00501061	AP00501722	AP00502455
AP00502685	AP00504229	AP00505271	AP00506536	AP00507477
AP00508718	AP00510397	AP00510907	AP00511365	AP00511467
AP00511593	AP00511881	AP00512450	AP00512702	AP00513005
AP00513076	AP00513353	AP00515937	AP00516269	AP00517802
AP00518073	AP00518244	AP00518578	AP00520942	AP00521592
AP00522089	AP00522853	AP00522888	AP00522906	AP00525103
AP00525185	AP00527707	AP00528515	AP00529266	AP00545206
AP00558178	AP00581903			

NCK 72.00.01	AP00549810	AP00551472	AP00559385	

NCK 72.01.00	AP00314739	AP00358136	AP00361551	AP00372547
AP00378594	AP00378709	AP00385933	AP00393741	AP00403179
AP00405035	AP00426214	AP00428598	AP00429296	AP00445390
AP00445700	AP00445749	AP00446603	AP00455456	AP00465312
AP00468043	AP00477191	AP00479603	AP00485507	AP00499352
AP00510377	AP00511825	AP00511914	AP00515440	AP00516313
AP00523397	AP00525032	AP00525710	AP00526880	AP00527403
AP00527477	AP00527707	AP00527922	AP00529940	AP00531852
AP00533900	AP00534906	AP00535141	AP00535281	AP00539276
AP00540093	AP00540211	AP00541119	AP00541184	AP00541927
AP00542378	AP00542576	AP00543649	AP00544851	AP00545779
AP00545947	AP00548575	AP00549810	AP00550901	AP00551472
AP00554872	AP00557112	AP00559385		

NCK 72.02.00	AP00340892	AP00361358	AP00400502	AP00439841
AP00461078	AP00465085	AP00487642	AP00494158	AP00507165
AP00533548	AP00535380	AP00542630	AP00542649	AP00543792
AP00547220	AP00550852	AP00554092	AP00556494	AP00557657
AP00559786	AP00559885	AP00562421	AP00563373	AP00564398
AP00564677	AP00574153	AP00580822		

NCK 72.03.00	AP00306970	AP00325604	AP00485930	AP00550711
AP00555180	AP00559437	AP00568111	AP00570920	AP00571432
AP00572416	AP00573862	AP00575360	AP00575649	AP00576367
AP00577259	AP00577679	AP00577957	AP00578149	AP00579891
AP00581769	AP00583487	AP00589565	AP00590740	AP00592891

AP00593940	AP00594072	AP00594449	AP00614163	

NCK 72.04.00	AP00493857	AP00494173	AP00549792	AP00551594
AP00568488	AP00569135	AP00570837	AP00571693	AP00579947
AP00584588	AP00591931	AP00593327	AP00597591	AP00599454
AP00599602	AP00602803	AP00603078	AP00609226	AP00610843
AP00612573	AP00614613	AP00615582	AP00617447	AP00617602

NCK 72.05.00	AP00504894	AP00520656	AP00545603	AP00551682
AP00557386	AP00559542	AP00560159	AP00565380	AP00571974
AP00577765	AP00581530	AP00590634	AP00595527	AP00597862
AP00599089	AP00612935	AP00616199	AP00623779	AP00625459
AP00625916	AP00626351	AP00629592	AP00635850	AP00637176
AP00638174	AP00641993	AP00642212	AP00642648	AP00643086
AP00646991	AP00649378			

NCK 72.05.01	AP00641176	AP00664149	AP00665209	

5. Information about the PLC:

- Toolbox, V01.05.01 or higher, and Step 7, version 5.4 SP2 or higher, are required.
- The current cycle time is no longer available in DB5, but in DB8 instead. The cycle time can also be called via the start information of OB1.
- The PLC module IM153-2 MLFB 6ES7 153-2AA02-0XB0 cannot be used.
  Remedy: 6ES7 153-1AA0**3**-0XB0
- The PLC series startup file must be generated when the PLC is stopped.
  It cannot otherwise be guaranteed that the PLC will switch to cyclic operation when the data backup has been loaded.
- Sinamics parameters are required for star / delta changeover with FC17.
  Prerequisites.
  The relevant DDS/MDS must be set up in the drive.
  P827[0] ⇔ P827[1] ⇔ P827[n] must be set to different values.
  The contactor is switched over by the application=> P833, Bit0=1
  The pulses are disabled by the drive => P833, Bit1=0
  Initial PLC position: Star mode, therefore set bit 21.5 in the axis DB to “1” during power-up.
- The X127 service interface on the NCU is to be used exclusively for start-up and service.
- The machine control panel (MCP) is operated on PROFIBUS or Ethernet. No mixed operation!
- The 'Exchange object' function in the PLC hardware configuration has not been released.
- PROFIBUS 1 must be configured so that the CU, supply and drive softkeys are displayed at the HMI.
- The PLC FORCEN function is not released in combination with 840D sl.

6. Information about the SINAMICS drive:

- The Starter may not be used in combination with Sinumerik V1.5 / V2.5.
- V1.4 / V2.4: No parallel use of measuring functions for i and n measurements via starter and HMI Advanced. Starter measurements require a Power OFF => ON and immediate measurement with the starter. Starter measurements must not be performed after HMI Advanced measurements.
- If a SINAMICS component is replaced and the software upgraded, the firmware release must be checked and, where necessary, the original firmware release restored.
  (Key word: macro 150399)
  Firmware releases can be checked in the following parameters:
  Control unit R18 ➔ Firmware release of CU
  Supply R128 ➔ Firmware release of infeed
  Drive MD R128 ➔Firmware release of power unit
  R148 ➔Firmware release of sensor module
- V1.4 / V2.4: For the time being, the starter is still required for determining the motor codes.

- Mains voltages: For smooth operation in the target country the following parameters must be set in the specified order:
  P010 = 1
  P210 = rated mains voltage in the target country
  P211 = rated mains frequency in the target country
  P340 = 1
  P3410 = 4
  P3900 = 3
  Save RAM to ROM
  Power OFF the system; power it ON again on the target network only.
  With the next ON command at ALM a network identification is run and the determined values are saved protected against power failure.
- The APC function increases the NCU load. Prior to using this function a performance estimate must be carried out.
- p1240, p1244, p1248, p1250:
  If Vdc control and DDS switchover have been activated in V2.4, check if correct values have been entered in the contents of indexes >0 of p1240 after upgrading the system.
- DMC20/HUB has not been released.
- 62.5 µs drive cycles are no longer released for 840D sl with Software Versions 1.5 HF 5 and NCU sl 2.5 HF 2.
- Temperature prewarning messages may occur sporadically (DB[axis].DBX94.0, DBX94.1) with Software Versions 1.5 HF 4 and NCU sl 2.5 HF 1
  Remedy: Only evaluate the signal in the PLC if this is pending in the VDI interface for more than 1.5 s.
- TM41 is no longer released for 840D sl and Software Versions 1.5 HF 4 and NCU sl 2.5 HF 1. This does no longer apply for Versionens 1.5 HF5 and 2.5 HF2.

7. Information about HMI Embedded:

- The HMI Embedded software V07.50.15.00 is started automatically as a component of the NCU software 1.5 in the power-up of the NCU7x0. HMI Embedded is also referred to as an "internal HMI".
- HMI Embedded can only be operated via a control panel with TCU connected via Ethernet to X120 on the NCU7x0.
- The configuring data, such as PLC message and alarm texts and HMI option package ("Wizard"), must be stored on the CompactFlash card in the NCU in the appropriate directories under /card/user/sinumerik/hmi/... or /card/oem/sinumerik/hmi/... (see documentation IM2, BE1). The file system on the CompactFlash card can be accessed in "online" mode only, i.e. when the NCU is running. The data can be transferred either by means of a USB stick or network link via the HMI operator interface (startup / HMI area) or by means of a network link and the WinSCP tool.
  IMPORTANT: File names of configuring files must normally be written in lower case letters.
- Display MD 9990 SW_OPTIONS has no significance. All HMI options must be activated through license management.
- The option "Additional 256MB HMI user memory on the CompactFlash card" is required to be able to store part programs and archives on the CompactFlash card ("local drive"). NOTICE: An NCK general reset deletes the option and renders the "local drive" inaccessible until the option is set again. Existing data stored on the card are not affected.
- If you are operating an NCU without TCU (i.e. with HMI Advanced on PCU 50), it is advisable to deactivate HMI Embedded. You can do this by executing command "sc disable hmi" in the service shell.
- OP keyboards can be switched between upper case and lower case letters by simultaneously pressing Shift+Ctrl. To be able to use the characters represented when pressing Shift (e.g. Shift A => [ ), capitalization must be active.

7. 1 Limitations in HMI Embedded:

- Mouse operation is not supported, operation via touch panel (also not with HT8) is not permissible.
- Copying a file to CF card by overwriting an existing file with the same name will cause an "internal error" message. The file with the same name must be deleted before.
- Display MD 9210 USER_CLASS_WRITE_ZOA is not active for "active work offset" in the Parameter area.
- Display MD 9900 MD_TEXT_SWITCH does not have any effect.

- All configured network drives (access to server via Ethernet) must be permanently accessible during the runtime of HMI Embedded.
- For the commissioning of the SINAMICS drives, an external HMI Advanced, software version 7.3 or higher, or commissioning tool 7.3 is required (the CD SINUCOM includes the commissioning tool).
- Processing from external sources / EXTCALL is only permissible with single-channel machines.
- Loadable compile cycles cannot be backed up or read in using NC series startup archive. Loadable compile cycles are stored on the CF card of the NCU and retained in case of NC memory reset. They can be handled like HMI configuring data.
- In a part program with EXTCALL calls, there must be at least one other NC block between two sequential EXTCALL calls with a processing duration of at least one second.
- When very big files are saved on CF card, the message "Please wait – File being flashed" is displayed. This message must be acknowledged by pressing the Recall button. If you want to switch off the control after having saved the file, you will have to wait for one second for each MB file size.
- After reading in a NC series startup archive, an explicit restart of the HMI is required, e.g. through NCK reset or operation with CTRL + Q, Enter.
- It is not possible to integrate a user boot screen.
- The HMI screen disappears when actuating the TAB key. It can be restored via the shortcut Ctrl+L (language switchover) or Ctrl+Q, Enter (restart HMI).

8. Information about the NCU Base software:

- The Linux operating system of the NCU7x0 is also referred to as the NCU Base software, similar to the PCU Base software for the PCU 50. You will find the relevant documentation in IM7 on the DVD-ROM. The NCU base software ensures the start among other things of the NC, PLC, and HMI software during power-up, as well as the booting of the TCU if it is present. The NCU Base software is user-oriented, i.e. you must log in and enter a password in order to acquire specific access authorization. This current login and password protection is only relevant for accessing a Linux service shell or the CompactFlash card using WinSCP. For startup and servicing activities, the login ID is "manufact" and the password "SUNRISE" (case-sensitive!). To open the Linux service shell on the TCU, press keys "Area switchover" and "Recall" (F10 and F9) simultaneously, then "Scan for Servers", "2" or boot from the USB service system.
- For access via the network using WinSCP, enter the abovementioned login and password on the "Session" screen. This login procedure also applies after the NCU7x0 has booted from a USB stick with the NCU service system provided that executable NCU software is installed on the CompactFlash card. If this is not the case (e.g. if the CompactFlash card is empty), enter the login ID "admin" and password "SUNRISE".
- You can display a list of the syntax of all available service commands in the service shell by running the command "sc help".

8. 1 New functions in the NCU base software:

- Synchronization of all NCUs and PCUs within the plant / system network regarding DHCP server and TCU data as well as domain name service (DNS).
- Routing of an NCU via X127 within the entire plant / system network.
- Operation of an HT2
- Improved data and time synchronization within the NCU.

8. 2 Networking:

- **Please observe the current documentation "Operator Components and Networking (IM5) Version 04/2008" !**
- Important system and network settings for the NCU base software have been preset in the file **basesys.ini** in the directory /card/user/system/etc and may be modified there. The original basesys.ini is located at /card/siemens/system/etc, it is entitled "template-basesys.ini".
  Each NCU within the plant / system network should be assigned a unique ("talking") computer name, together with the entry "Host name=..." in basesys.ini. Permissible characters are uppercases / lowercases, numbers and minus signs.

- The NCU DHCP server should always be switched on.
- When upgrading the system from SW 1.3 / 1.4 please ensure that no old mcp_client.ini file remains in /card/user/sinumerik/mcp_client.

8.2.1 Configuring 1 NCU with TCUs and MCPs

In this configuration, no special settings must be made in the basesys.ini.
The DHCP server and internal HMI-Embedded remain activated.

8.2.2 Configuring 1 NCU with 1 PCU 50, MCPs and TCUs, if required

In this configuration, make the following settings in the basesys.ini of the NCU:

Host name = ...
SyncModeDHCPD_SysNet = ON_MASTER

In general, the internal HMI-Embedded must be deactivated because two HMIs (HMI-Advanced and HMI-Embedded/JobShop) may only be operated on one NCU in particular cases.
On PCU 50, we recommend that you use PCU base software V8.1 SP3 or later.
In the System Network Center, tab TCU Support, select the default configuration "No boot support".
If the system is equipped with a TCU (HT8) that shall be switched to PCU 50 by default, the following entries must be made in the file /card/user/common/tcu/<TCU Name>/common/tcu/config.ini on the NCU

MaxHostIndex = 1
[host_1]
Address = <*IP address of the PCU*>.

8.2.3 Configuring several NCUs and, if necessary, 1 or several PCUs, TCUs, MCPs

In this configuration, make the following settings in the basesys.ini of the NCU:

Unique host name = ... for each NCU
Unique InternalIP= ....
Unique InternalNetMask= ....
Exactly one NCU with SyncModeDHCPD_SysNet = ON_MASTER

On PCU 50, you have to use PCU base software V8.1 SP3 or later.
In the System Network Center, tab TCU Support, leave the default configuration "Complete TCUsupport" unchanged. Under the tab DHCP Settings, we recommend to set "Sync mode low priority".
All operator stations within the plant / system network (TCUs, HT8, PCU 50) are managed on the NCU with "ON_MASTER", that means the config.ini files as well as the .leases file comprising all IP addresses assigned within the system which are relevant during the runtime are stored there.
The config.ini files are distributed to all other NCUs / PCUs by the master NCU using the service command "sc distribute tcudata".
Via the Service command "sc clear dhcp" and subsequent power ON / OFF of the complete system, the NCUs / PCUs are assigned preset IP addresses. New addresses are assigned to TCUs and MCPs and the .leases file is then distributed to all other NCUs / PCUs.
Important: The System Network Center, tab OPs allows to directly edit on each PCU 50 the config.ini files of all operator stations on the master NCU. The data are automatically distributed to all NCUs / PCUs each time they are changed.

9. Information about technology cycles:

NCU software 1.5 includes the technology cycles (standard cycles) 07.05.05 in an installable form.

Installing the technology cycles:

Step 1 - Reading in the archives

Read in the necessary archive files:

cyccust_gr.arc	;*Archive for user cycles German
cyccust_uk.arc	;*Archive for user cycles English
cycles.arc	;*Archive with all standard cycles (milling and turning cycles)

cycmill.arc	;*Archive with all milling cycles
cycturn.arc	;*Archive with all milling cycles
defines.arc	;*Archive with definition files

In the "Services" area, select the "Program data" softkey and navigate to "Cycle archive" using the cursor keys; to open, use the Input key. In the "Cycle archive" area, navigate to "Standard cycles" using the cursor keys; to open, use the Input key.
Read in the necessary archive files by selecting the vertical softkey "Read in archive".
Note: The archive files must be selected and read in separately. Once all the relevant archive files have been read in, you must perform an NCK reset by selecting softkey "NCK Reset" in the "Startup" area.

Step 2 - Activating the definition files
In the "Program" area, select the ETC key ">" to go to the 3rd level. On this level, select the "Definition files" softkey, select the definitions separately and activate them using the "Activate" softkey.

Step 3 - Activating the "Swivel cycle" softkey in the "Start-up" area
In the "Program" area / "Standard cycles", edit the "common.com" file and delete the semicolon in the beginning of the line

;SC616 = STARTUP.COM

Then select the "NCK Reset" softkey in the ">>Startup" area.

Step 4 – Activating the "Thread recutting" softkey in the "Machine" area "Jog"
In the "Program" area / "Standard cycles", edit the "common.com" file and delete the semicolon in the beginning of the line

;SC108 = MA_JOG.COM

Then select the "NCK Reset" softkey in the ">>Startup" area.

10. Information about measuring cycles:
NCU software 1.5 includes the measuring cycles 07.05.03 in an installable form.

Installing the measuring cycles:

Step 1 - Machine data settings
The machine data listed below apply for the use of Siemens standard and measuring cycles:

(1) Machine data (memory-configuring) for Global User Data (GUDs):
MD 18130: MM_NUM_GUD_NAMES_CHAN=130

(2) Machine data (memory-configuring) for number of cycles and number of transfer parameters
MD 18180: MM_NUM_MAX_FUNC_PARAM=800

(3) Further machine data for measuring cycles
MD 11420: LEN_PROTOCOL_FILE=5
(maximum file size for protocol file, set in KB)
MD 28082: MM_SYSTEM_FRAME_MASK Bit0 und Bit5 =1
(system frames for scratching and cycles)

Step 2 - Reading in the archives
Read in the necessary archive files:

cyccust_gr.arc	;*Archive for user cycles German
cyccust_uk.arc	;*Archive for user cycles English
mcycles.arc	;*Archive with all measuring cycles (milling and turning)
mcycmill.arc	;*Archive with all measuring cycles for milling
mcycturn.arc	;*Archive with all measuring cycles for turning
defines.arc	;*Archive with definition files (GUD5.DEF, GUD6.DEF, GUD7_MC.DEF)

jogmcyc.arc ;*Archive with all measuring cycles for measuring in JOG

In the "Services" area, select the "Program data" softkey and navigate to "Cycle archive" using the cursor keys; to open, use the Input key. In the "Cycle archive" area, navigate to "Measuring cycles" using the cursor keys; to open, use the Input key.
Read in the necessary archive files by selecting the 1st vertical softkey "Read in archive".
Note: The archive files must be selected and read in separately. Once all the relevant archive files have been read in, you must perform an NCK reset by selecting softkey "NCK Reset" in the "Startup" area.

Step 3 - Activating the definition files
In the "Program" area, select the ETC key ">" to go to the 3rd level. On this level, select the "Definition files" softkey, select the definitions GUD5.DEF, GUD6.DEF and GUD7.DEF separately and activate them using the "Activate" softkey.

Step 4 - Activating the access softkeys "Measurement turning" and "Measurement milling" for support
In the "Program" area / "Standard cycles", edit the "common.com" file and delete the semicolon in the beginning of the line

;SC326 = AEDITOR.COM ;* "Measurement turning" softkey
;SC327 = AEDITOR.COM ;* "Measurement milling" softkey

Then select the "NCK Reset" softkey in the ">>Startup" area.

Step 5 - Activating the "Measuring cycles" softkey in the "Start-up" area
In the "Program" area / "Standard cycles", edit the "common.com" file and delete the semicolon in the beginning of the line

;SC617 = STARTUP.COM

Then select the "NCK Reset" softkey in the ">>Startup" area.

11. Notes on the cycles (ISO cycles) for the "Online ISO Dialect Interpreter":
NCU software 1.5 includes the ISO cycles 06.05.02 in an installable form.

Installing the ISO cycles:
Installation of the ISO cycles requires previous commissioning of the standard cycles. Before you begin the startup process, you should ensure that the existing status is saved to an archive; read out a series startup archive if necessary.

Documentation:	ISO dialects for SINUMERIK	6FC5297-6AE10-0APx
	Programming Manual ISO Milling	6FC5298-6AC20-0BPx
	Programming Manual ISO Turning	6FC5298-6CA00-0BGx

Step 1 - Machine data settings:
You can activate the Online ISO Dialect Interpreter using the machine data 18800 $MN_EXTERN_LANGUAGE. The language types ISO dialect M (Milling) or T (Turning) can be selected via machine data 10880 $MN_EXTERN_CNC_SYSTEM.

Step 2 - Reading in the archives

isomill.arc	;*Archive with all ISO cycles for milling
isoturn.arc	;*Archive with all ISO cycles for turning
defines.arc	;*Archive with definition file (GUD7_ISO.DEF)

For the procedure for reading in the archive files, please refer to: "Information about the technology cycles"

An overview of the path structure on the CompactFlash card in which the files for the ISO cycles are stored can be found below.

siemens/
sinumerik/
cycles/

```
isoc/
        hlps/                   ;Help files
        lngs/                   ;Language files
        prog/                   ;Includes archives for the ISO cycles
                defines.arc     ;Includes GUD7_ISO.DEF
                isomill.arc     ;Includes the ISO cycles for milling
                isoturn.arc     ;Includes the ISO cycles for turning
                versions.xml    ;The XML file contains the version number of the ISO cycle
                                 archives
        prog.cfs                ;Zipped prog/ folder
        proj/                   ;Configuration
                startstop.sh    ;Script file for linking the subfolders
          versions.xml          ;The XML file contains the version number
          proj.cfs              ;Zipped proj/ folder
          versions.xml          ;Includes the version numbers of the ISO cycles and archives
```

Step 3 - Activating the definition files

Activate the GUD7.DEF definition file. For the procedure for activating the definitions, please refer to: "Information about the technology cycles"

List of G codes with the corresponding envelope cycles and technology cycles:

Milling:

G Code	Envelope Cycle	Siemens Technology Cycles
G05	CYCLE305	
G08	CYCLE308	
G10.6	CYCLE3106	
G22	CYCLE322	
G23	CYCLE323	
G27	CYCLE328	
G28	CYCLE328	
G30	CYCLE330	
	CYCLE396	
G71.1 / 72.2	CYCLE3721	
G81	CYCLE381M	CYCLE82
G82	CYCLE381M	CYCLE82
G85	CYCLE381M	CYCLE85
G86	CYCLE381M	CYCLE88
G89	CYCLE381M	CYCLE85
G83	CYCLE383M	CYCLE83
G73	CYCLE383M	CYCLE83
G84	CYCLE384M	CYCLE3841
G74	CYCLE384M	CYCLE3841
G76	CYCLE387M	CYCLE86
G87	CYCLE387M	CYCLE861

Turning:

G Codes A/B/C	Envelope Cycle	Siemens Technology Cycles
G05	CYCLE305	
G10.6	CYCLE3106	
G22	CYCLE322	
G23	CYCLE323	
G27	CYCLE328	
G28	CYCLE328	
G30	CYCLE330	
	CYCLE396	
G50.2 / 51.2	CYCLE3512	
G70 / 70 / 72	CYCLE370T	
G71 / 71 / 73	CYCLE371T	CYCLE395
G90 / 77 / 20	CYCLE371T	
G72 / 72 / 74	CYCLE372T	CYCLE395
G94 / 79 / 24	CYCLE372T	
G73 / 73 / 75	CYCLE373T	
G74 / 74 / 76	CYCLE374T	CYCLE375T
G75 / 75 / 77	CYCLE374T	CYCLE375T
G76 / 76 / 78	CYCLE376T	CYCLE398
G92 / 78 / 21	CYCLE376T	CYCLE398
G83	CYCLE383T	CYCLE375T
G87	CYCLE383T	CYCLE375T
G84	CYCLE384T	CYCLE84
G88	CYCLE384T	CYCLE84
G85	CYCLE385T	CYCLE375T
G89	CYCLE385T	CYCLE375T