A1 - Interfaces

Data Link to Level 1

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2. Transaction Description ABB LINK

2.1 Messages Level 1 --> Level 2

2.1.1 Tracking Event

DSP no.: 200
Sender: HSM_MP4
Receiver: HSM_L2
Transmission Event: event concerning tracking occurred
Remarks: none

```
typedef struct                  /* message structure              */
{
  long            slabIdPE;     /* slab ID PE area (HMD 1 - HMD 7)  */
  long            slabIdRM;     /* slab ID RM area (HMD 8 - HMD 17) */
  long            slabIdFM;     /* slab ID FM area                  */
  long            bitmap;       /* tracking bitmap                  */
                                /*   2**0  not used                 */
                                /*   2**1  HMD 1                    */
                                /*   2**2  HMD 2                    */
                                /*   2**3  HMD 3                    */
                                /*   2**4  HMD 4                    */
                                /*   2**5  HMD 5                    */
                                /*   2**6  HMD 6                    */
                                /*   2**7  HMD 7                    */
                                /*   2**8  HMD 8                    */
                                /*   2**9  HMD 9                    */
                                /*   2**10 HMD 10                   */
                                /*   2**11 HMD 11                   */
                                /*   2**12 HMD 12                   */
                                /*   2**13 HMD 13                   */
                                /*   2**14 HMD 14                   */
                                /*   2**15 HMD 15                   */
                                /*   2**16 HMD 16                   */
                                /*   2**17 HMD 17                   */
```

... continued on next page

```
                                        /*   2**18 Stand F1                 */
                                        /*   2**19 Stand F2                 */
                                        /*   2**20 Stand F3                 */
                                        /*   2**21 Stand F4                 */
                                        /*   2**22 Stand F5                 */
                                        /*   2**23 Stand F6                 */
                                        /*   2**24 Pyrometer behind F6      */
                                        /*   2**25 Pyrometer in front of DC */
long          eventCode;     /* tracking event code            */
                                        /*   2**0  PE (set at start of      */
                                        /*         edging - reset at end)   */
                                        /*   2**1  RM (set at start of pass */
                                        /*         reset at end of pass)    */
                                        /*   2**2  FM (set at start of      */
                                        /*         rolling - reset at end   */

} LV1_MsgTraEve, *LV1_MsgTraEvePtr;
```

2.1.2 PE - Start of Rolling

DSP no.:	202
Sender:	HSM_MP1
Receiver:	HSM_L2
Transmission Event:	Slab head enters PE
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long           slabId;        /* slab identification              */
  long           edgAdjust;     /* edger adjust [in. x 10**2]       */
  long           speed;         /* speed PE     [fpm]               */

} LV1_MsgPEstartRol, *LV1_MsgPEstartRolPtr;
```

2.1.3 PE - End of Rolling

DSP no.:	203
Sender:	HSM_MP1
Receiver:	HSM_L2
Transmission Event:	Slab tail leaves PE
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long           slabId;        /* slab identification              */

} LV1_MsgPEendRol,   *LV1_MsgPEendRolPtr;
```

2.1.4 PE - Drive Status

DSP no.:	204
Sender:	HSM_MP1
Receiver:	HSM_L2
Transmission Event:	Cyclically every minute
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long           status;        /* 0 = PE-Drive OFF, 1 = PE-Drive ON*/
                                /* sent cyclically every minute     */

} LV1_MsgPEdriveStatus, *LV1_MsgPEdriveStatusPtr;
```

2.1.5 RM - Calibration

DSP no.:	206
Sender:	HSM_MP2
Receiver:	HSM_L2
Transmission Event:	Calibration of RM finished
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long          force;          /* calibration force center [ton]   */
  float         screwDownOS;    /* calib. screw down OS [in]        */
  float         screwDownDS;    /* calib. screw down DS [in]        */

} LV1_MsgRMcalibration, *LV1_MsgRMcalibrationPtr;
```

2.1.6 RM - Start of Pass

DSP no.: 220
Sender: HSM_MP2
Receiver: HSM_L2
Transmission Event: Start of pass in RM
Remarks: none

```
typedef struct                  /* message structure                */
{
  long           slabId;        /* slab identification              */
  long           pasNo;         /* actual pass number               */
  long           blindActive;   /* blind - active indicator         */
                                /*   0 ... blind pass               */
                                /*   1 ... active pass              */
  long           indiLastPas;   /* indication last pass started:    */
                                /*   0 ... not yet last pass        */
                                /*   1 ... last pass started        */

  long           edgAdjust;     /* actual edger adjust [in. x 10**2]*/
                                /* -1 = not used (even pass)        */
  long           speedRMDT;     /* actual speed RMDT [fpm]          */
  long           rollCooling;   /* roll cooling (0 = OFF / 1 = ON)  */

} LV1_MsgRMstartPas, *LV1_MsgRMstartPasPtr;
```

2.1.7 RM - Measured Pass Data

DSP no.: 221
Sender: HSM_MP2
Receiver: HSM_L2
Transmission Event: cyclically (200 - 300ms), starting at signal strip in RM
Remarks: none

```
typedef struct                  /* message structure                */
{
  long          slabId;         /* slab identification              */
  long          pasNo;          /* actual pass number               */
  long          blindActive;    /* blind - active indicator         */
                                /*   0 ... blind pass               */
                                /*   1 ... active pass              */
  long          seqNo;          /* measurement sequence number      */
  float         location;       /* material location [fpm]          */
                                /*  location 0 for head on odd pass */
                                /*  location 0 for tail on even pas */
  float         timeStartPas;   /* time from start of pass [s]      */
  long          tempEntry;      /* material temp. entry side [oF]   */
  long          tempDel;        /* material temp. delivery side [oF]*/
  long          RMforceOS;      /* RM roll force operator side [ton]*/
  long          RMforceDS;      /* RM roll force drive side    [ton]*/
  long          RMtorque;       /* RM roll torque [ft.lb.]          */
  long          RMspeed;        /* RM rolling speed [fpm]           */
  long          RMscrewDownDS;  /* RM screw down Drive Side         */
                                /* (no load gap) [in x 10**3]       */
  long          RMscrewDownOS;  /* RM screw down Operator Side      */
                                /* (no load gap) [in x 10**3]       */
  long          edgAdjust;      /* actual edger adjust [in. x 10**2]*/
                                /* -1 = not used (even pass)        */
  float         current;        /* motor current [amp]              */
  float         volt;           /* motor volts [volt]               */
  float         descPressure;   /* descaling pressure [psi]         */
  long          operMode;       /* RM operation mode:               */
                                /*      0 ... manual mode           */
                                /*      1 ... level 1 mode          */
                                /*      2 ... level 2 mode          */

} LV1_MsgRMmeaPasDat, *LV1_MsgRMmeaPasDatPtr;
```

2.1.8 RM - End of Pass

DSP no.:	222
Sender:	HSM_MP2
Receiver:	HSM_L2
Transmission Event:	End of pass in RM
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long           slabId;        /* slab identification              */
  long           pasNo;         /* actual pass number               */

} LV1_MsgRMendPas,   *LV1_MsgRMendPasPtr;
```

2.1.9 General Information RM Area

DSP no.: 224
Sender: HSM_MP2
Receiver: HSM_L2
Transmission Event: Table cover position or descaler state changed
Remarks: none

```
typedef struct                  /* message structure                */
{
  long           posTableCover; /* position table cover 1 - 4:      */
                                /*                                  */
                                /*    +----------- CLOSED           */
                                /*    |    +------ INTERMEDIATE POS.*/
                                /*    |    |    +- OPEN             */
                                /*    |    |    |                   */
                                /* +--+ +--+ +--+                   */
                                /* 0000 0000 0000                   */
                                /* |||| |||| ||||  Bit              */
                                /* |||| |||| |||+- 2**0  Tab.Cov. 1 */
                                /* |||| |||| ||+-- 2**1  Tab.Cov. 2 */
                                /* |||| |||| |+--- 2**2  Tab.Cov. 3 */
                                /* |||| |||| +---- 2**3  Tab.Cov. 4 */
                                /* |||| ||||                        */
                                /* |||| |||+------ 2**4  Tab.Cov. 1 */
                                /* |||| ||+------- 2**5  Tab.Cov. 2 */
                                /* |||| |+-------- 2**6  Tab.Cov. 3 */
                                /* |||| +--------- 2**7  Tab.Cov. 4 */
                                /* ||||                             */
                                /* |||+---------- 2**8  Tab.Cov. 1 */
                                /* ||+----------- 2**9  Tab.Cov. 2 */
                                /* |+------------ 2**10 Tab.Cov. 3 */
                                /* +------------- 2**11 Tab.Cov. 4 */
                                /*                                  */
                                /* all other bits not used          */
                                /*                                  */
  long           descalerState; /* descaler state:                 */
                                /*   bit 2**0 primary descaler south*/
                                /*   bit 2**1 primary descaler north*/
                                /*   bit 2**2 RM descaler entry top */
                                /*   bit 2**3 RM descaler entry bot */
                                /*   bit 2**4 RM descaler deliv top */
                                /*   bit 2**5 RM descaler deliv bot */
} LV1_MsgRMgenInfo, *LV1_MsgRMgenInfoPtr;
```

2.1.9.1 FM - Start of Rolling

DSP no.:	237
Sender:	HSM_MP4
Receiver:	HSM_L2
Transmission Event:	Signal “Strip in Mill” at stand F1
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long           slabId;        /* slab identification              */
  long           descBitmap;    /* descaling bitmap PR scale breaker*/
                                /*   bit 2**0 Descale South         */
                                /*   bit 2**1 Descale North         */
  long           operMode;      /* FM operation mode:               */
                                /*      0 ... manual mode           */
                                /*      1 ... level 1 mode          */
                                /*      2 ... level 2 mode          */

} LV1_MsgFMstartRol, *LV1_MsgFMstartRolPtr;
```

2.1.9.2 FM - End of Rolling

DSP no.: 238
Sender: HSM_MP4
Receiver: HSM_L2
Transmission Event: Strip tail end leaves F6
Remarks: none

```
typedef struct                  /* message structure                */
{
  long        slabId;           /* slab identification              */
  float       totStripLen;      /* total strip length [ft]          */
  long        coolPattern;      /* actual selected cooling pattern  */
                                /*   bit 2**0  spare                */
                                /*  Top cooling sprays:             */
                                /*   bit 2**1  section 1            */
                                /*   bit 2**2  section 2   Main     */
                                /*   bit 2**3  section 3  Cooling   */
                                /*   bit 2**4  section 4  Section   */
                                /*   bit 2**5  section 5            */
                                /*   bit 2**6  section 6            */
                                /*                                  */
                                /*   bit 2**7  section 7    Trim    */
                                /*   bit 2**8  section 8   Cooling  */
                                /*   bit 2**9  section 9   Section  */
                                /*   bit 2**10 section 10           */
                                /*                                  */
                                /*  Bottom cooling sprays:          */
                                /*   bit 2**11 section 1            */
                                /*   bit 2**12 section 2            */
                                /*   bit 2**13 section 3            */
                                /*   bit 2**14 section 4            */
  long        curLimitReached;  /* bitmap for current limit reached */
                                /*   bit 2**0  spare                */
                                /*   bit 2**1  stand F1             */
                                /*   bit 2**2  stand F2             */
                                /*   bit 2**3  stand F3             */
                                /*   bit 2**4  stand F4             */
                                /*   bit 2**5  stand F5             */
                                /*   bit 2**6  stand F6             */

  long        manualSpeedCorr;  /* manual speed correction          */
                                /*   -1 ... speed decrease          */
                                /*    0 ... no correction           */
                                /*    1 ... speed increase          */

} LV1_MsgFMendRol, *LV1_MsgFMendRolPtr;
```

2.1.9.3 FM - Measured Entry Data

DSP no.: 239
Sender: HSM_MP4
Receiver: HSM_L2
Transmission Event: cyclically (200 - 300ms), starting at first temperature reading from FM entry pyrometer
Remarks: none

```
typedef struct                  /* message structure                */
{
  long          slabId;         /* slab identification              */
  long          seqNo;          /* measurement sequence number      */
  long          speedRT;        /* Speed roller table (RMDT) [fpm]  */
  float         timePyr;        /* time since TB head entered       */
                                /* pyrometer [s]                    */
  long          temp;           /* actual temp. of segment [oF]     */

  float         lubeFlowRateF1;/* actual flow rate F1 [Gpm]         */
  float         lubeFlowRateF2;/* actual flow rate F2 [Gpm]         */
  float         lubeFlowRateF3;/* actual flow rate F3 [Gpm]         */
  float         lubeFlowRateF4;/* actual flow rate F4 [Gpm]         */

} LV1_MsgFMmeaEntryDat, *LV1_MsgFMmeaEntryDatPtr;
```

Remarks: **lubeFlowRateFx**
while no strip in mill, value has to be zero (0.0)

2.1.9.4 FM - Measured Rolling Exit Data

DSP no.: 240
Sender: HSM_MP4
Receiver: HSM_L2
Transmission Event: cyclically (200 - 300ms), starting at first measurement from gauge meter behind F6
Remarks: none

```
typedef struct                  /* message structure                */
{
  long         slabId;          /* slab identification              */
  long         seqNo;           /* measurement sequence number      */
  float        location;        /* strip location (0. for head) [ft]*/
  long         thick;           /* X-Ray thickness cold [in x 10**3]*/
  long         width;           /* width gauge [in x 10**2]         */
  long         temp;            /* temperature [oF]                 */
  long         profile;         /* average profile [in x 10**5]     */
  long         wedge;           /* wedge [in x 10**5]               */
  long         edgeDropOS;      /* edge drop [in x 10**5]           */
  long         edgeDropDS;      /* edge drop [in x 10**5]           */
  long         devCentLine;     /* centerline deviation [in x 10**5]*/
  float        shapeFactor;     /* shape factor [%]                 */
  float        delTime;         /* delta time since head passed [s] */
  long         coolPattern;     /* actual cooling pattern           */
                                /*   bit 2**0  spare                */
                                /*  Top cooling sprays:             */
                                /*   bit 2**1  section 1            */
                                /*   bit 2**2  section 2   Main     */
                                /*   bit 2**3  section 3  Cooling   */
                                /*   bit 2**4  section 4  Section   */
                                /*   bit 2**5  section 5            */
                                /*   bit 2**6  section 6            */
                                /*                                  */
                                /*   bit 2**7  section 7    Trim    */
                                /*   bit 2**8  section 8   Cooling  */
                                /*   bit 2**9  section 9   Section  */
                                /*   bit 2**10 section 10           */
                                /*                                  */
                                /*  Bottom cooling sprays:          */
                                /*   bit 2**11 section 1            */
                                /*   bit 2**12 section 2            */
                                /*   bit 2**13 section 3            */
                                /*   bit 2**14 section 4            */
  long         actProfile;      /* act. profile reading [in x 10**5]*/
                                /*   -1 = start/end of cycle        */
  long         actProfilePos;   /* position of act. profile reading */
                                /* (width) [in x 10**2]             */

} LV1_MsgFMmeaExitDat, *LV1_MsgFMmeaExitDatPtr;
```

2.1.9.5 FM - Measured Finishing Data

DSP no.:	241
Sender:	HSM_MP4
Receiver:	HSM_L2
Transmission Event:	cyclically (200 - 300ms), starting at first temperature reading from down coiler entry side pyrometer
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long          slabId;         /* slab identification              */
  long          seqNo;          /* measurement sequence number      */
  float         location;       /* strip location (0. for head) [ft]*/
  long          temp;           /* temperature [oF]                 */
  float         delTime;        /* delta time since head passed [s] */

} LV1_MsgFMmeaFinDat, *LV1_MsgFMmeaFinDatPtr;
```

2.1.9.6 FM - Measured Stand Data

DSP no.: 191 - Stand F1
192 - Stand F2
193 - Stand F3
194 - Stand F4
195 - Stand F5
196 - Stand F6

Sender: HSM_MP4

Receiver: HSM_L2

Transmission Event: cyclically (200 - 300ms), starting at signal "Strip in Mill"

Remarks: none

```
typedef struct                  /* message structure               */
{
  long          slabId;         /* slab identification             */
  long          seqNo;          /* measurement sequence number     */
  float         delTime;        /* delt.time since strip in mill [s]*/
  float         current;        /* motor current [amp]             */
  float         volt;           /* motor volts [volt]              */
  float         looperAngle;    /* actual looper angle [deg]       */
  float         speed;          /* rolling speed [fpm]             */

} LV1_MsgFMmeaStandDat, *LV1_MsgFMmeaStandDatPtr;
```

2.1.9.7 FM - State Change

DSP no.: 246
Sender: HSM_MP4
Receiver: HSM_L2
Transmission Event: - State of a stand has changed (operator input L1 MMI)
Remarks: none

```
typedef struct                  /* message structure                */
{
  long           stateMap;      /* actual state bitmap:             */
                                /*   bit set   ... stand active     */
                                /*   bit clear ... dummy stand      */
                                /*                                  */
                                /*   bit 2**0  spare                */
                                /*   bit 2**1  stand F1             */
                                /*   bit 2**2  stand F2             */
                                /*   bit 2**3  stand F3             */
                                /*   bit 2**4  stand F4             */
                                /*   bit 2**5  stand F5             */
                                /*   bit 2**6  stand F6             */

} LV1_MsgFMstateChange, *LV1_MsgFMstateChangePtr;
```

2.2 Messages Level 2 --> Level 1 (ABB)

2.2.1 Level 2 Watchdog

DSP no.:	255
Sender:	HSM_L2
Receiver:	HSM_MP2
Transmission Event:	cyclically every 6 sec.
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long           hours;         /* L2 system time - hours           */
  long           minutes;       /* L2 system time - minutes         */
  long           seconds;       /* L2 system time - seconds         */
  long           flag;          /* watchdow flag (always 1)         */

} LV1_MsgL2Watchdog, *LV1_MsgL2WatchdogPtr;
```

2.2.2 Level 2 Alarm Message

DSP no.: 254
Sender: HSM_L2
Receiver: HSM_MP2
Transmission Event: one of following listed alarms goes ON or OFF
Remarks: none

```
typedef struct                  /* message structure                */
{
  long           bitmap01;      /* alarm bitmap:                    */
                                /*  bit set   = Alarm is ON         */
                                /*  bit clear = Alarm is OFF        */
                                /*                                  */
                                /*  2**0 - AGC link to level 2 down */
                                /*  2**1 through                    */
                                /*  2*31   not used                 */
                                /*                                  */
} LV1_MsgL2Alarm, *LV1_MsgL2AlarmPtr;
```

2.2.3 PE - Setup Data

DSP no.:	201
Sender:	HSM_L2
Receiver:	HSM_MP1
Transmission Event:	- Charging of 1. slab into furnace - Furnace discharging - Last pass finished (for next slab in furnace)
Remarks:	none

```
typedef struct                  /* message structure               */
{
  long           slabId;        /* slab identification             */
  float          slabLen;       /* slab length     [ft.]           */
  long           slabWidth;     /* slab width      [in. x 10**2]   */
  long           slabThick;     /* slab thickness  [in. x 10**3]   */
  long           edgAdjust;     /* edger adjust    [in. x 10**2]   */

} LV1_MsgPEsetup, *LV1_MsgPEsetupPtr;
```

2.2.4 PE - Stand Data

DSP no.:	205
Sender:	HSM_L2
Receiver:	HSM_MP1
Transmission Event:	Operator on level 2 has entered PE roll diameters
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long           rollDia;       /* roll diameter   [in. x 10**2]    */

} LV1_MsgPEstandData, *LV1_MsgPEstandDataPtr;
```

2.2.5 RM - Setup Data

This message consists of several DSP's:

210	Setup header data
211	Setup data for pass 1
212	Setup data for pass 2
:	
219	Setup data for pass 9

2.2.5.1 RM Setup - Header Data

DSP no.:	210
Sender:	HSM_L2
Receiver:	HSM_MP2
Transmission Event:	- Charging of 1. slab into furnace - Furnace discharging - Last pass finished (for next slab in furnace)
Remarks:	all dimensions are related to hot material

```
typedef struct                  /* message structure                */
{
  long          slabId;         /* slab identification              */
  long          pasSchNo;       /* adjusted pass schedule number    */
  float         slabLen;        /* slab length [ft.]                */
  long          slabWidth;      /* slab width  [in. x 10**2]        */
  long          slabThick;      /* slab thickness [in. x 10**3]     */
  long          tgtWidthTB;     /* target transfer bar width        */
                                /* [in. x 10**2]                    */
  long          tgtThickTB;     /* target transfer bar thickness    */
                                /* [in. x 10**3]                    */
  long          slabDischTemp;  /* average slab discharg. temp [oF] */
  long          descSpeed;      /* descaling speed [fpm]            */
  long          totPasNo;       /* total number of passes           */

} LV1_MsgRMsetupHdr, *LV1_MsgRMsetupHdrPtr;
```

2.2.5.2 RM Setup - Pass Data

DSP no.:	211 - 219
Sender:	HSM_L2
Receiver:	HSM_MP2
Transmission Event:	In continuation of Setup Header Data RM
Remarks:	all dimensions are related to hot material

```
typedef struct                  /* message structure                */
{
  long          blindActive;    /* blind - active indicator         */
                                /*   0 ... blind pass               */
                                /*   1 ... active pass              */
  long          posSGRMET;      /* position side guide RM entry tabl*/
                                /* [in. x 10**2]                    */
  long          posSGRMDT;      /* position side guide RM deliv.tabl*/
                                /* [in. x 10**2]                    */
  long          edgAdjust;      /* edger adjust                     */
                                /*     -1 = not used (even pass)    */
                                /* [in. x 10**2]                    */
  long          screwDown;      /* rougher screw down [in. x 10**3] */
  long          millEntrySpeed;/* mill entry speed   [fpm]          */
  long          millRunSpeed;   /* mill run speed     [fpm]         */
  long          edgEntrySpeed; /* edger entry speed  [fpm]          */
  long          edgRunSpeed;    /* edger run speed    [fpm]         */
  long          descBitmap;     /* descaling bitmap                 */
                                /*   bit 2**0 primary descaler south*/
                                /*   bit 2**1 primary descaler north*/
                                /*   bit 2**2 RM descaler entry top */
                                /*   bit 2**3 RM descaler entry bot */
                                /*   bit 2**4 RM descaler deliv top */
                                /*   bit 2**5 RM descaler deliv bot */

} LV1_MsgRMsetupPas, *LV1_MsgRMsetupPasPtr;
```

2.2.6 RM - Stand Data

DSP no.:	223
Sender:	HSM_L2
Receiver:	HSM_MP2
Transmission Event:	- Operator on L2 has completed roll change for RM - Operator has entered new RM-Edger roll diameter
Remarks:	none

```
typedef struct                  /* message structure               */
{
  long           indicator;     /* indicator for roll kind         */
                                /*   1 ... is RM-Edger roll diam   */
                                /*   2 ... is RM work  roll diam   */
  long           rollDia;       /* roll diameter [in x 10**2]      */

} LV1_MsgRMstandData, *LV1_MsgRMstandDataPtr;
```

2.2.7 FM - Setup Data

This message consists of several DSP's:

230	Setup header data
231	Setup data for stand F1
232	Setup data for stand F2
:	
236	Setup data for stand F6

2.2.7.1 FM Setup - Header Data

DSP no.:	230
Sender:	HSM_L2
Receiver:	HSM_MP4
Transmission Event:	- Furnace discharging - Last pass RM
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long        slabId;           /* slab identification              */
  long        pasSchNo;         /* adjusted pass schedule number    */
                                /*   0 ... pass schedule from model */
                                /*  >0 ... pass schedule from table */
  long        widthTB;          /* transfer bar width [in x 10**2]  */
  long        thickTB;          /* transf.bar thickness [in x 10**3]*/
  long        finalWidthHot;    /* tgt strip width hot[in x 10**2]  */
  long        tgtTempF6;        /* target temperature after F6 [oF] */
  long        posSGPR;          /* position PR scale breaker side   */
                                /* guide [in x 10**2]               */
  long        speedPR;          /* speed PR scale breaker [fpm]     */
  long        descBitmapPR;     /* descaling bitmap PR scale breaker*/
                                /*   bit 2**0 Descale South         */
                                /*   bit 2**1 Descale North         */
  long        timOnSouth;       /* time to be ON - descale SOUTH [s]*/
  long        timOnNorth;       /* time to be ON - descale NORTH [s]*/
  long        interStandCoolMap;/* Interstand cooling map:          */
                                /*   bit 2**1 header between F1-F2  */
                                /*   bit 2**2 header between F2-F3  */
                                /*     0 = header OFF               */
                                /*     1 = header ON                */
  long        timeF1F2ON;       /* Duration of cooling between F1-F2*/
  long        timeF2F3ON;       /* Duration of cooling between F2-F3*/
  long        finalWidthCold;   /* target strip width cold          */
                                /* [in x 10**2]                     */
  long        tgtStripThickHot; /* tgt strip thick.hot [in x 10**3] */
  long        tgtStripThickCold;/* tgt strip thick.cold [in x 10**3]*/

} LV1_MsgFMsetupHdr, *LV1_MsgFMsetupHdrPtr;
```

2.2.7.2 FM Setup - Stand Specifc Data

DSP no.:	231-236
Sender:	HSM_L2
Receiver:	HSM_MP4
Transmission Event:	In continuation of Setup Header Data FM
Remarks:	none

```
typedef struct                  /* message structure                */
{
  long          posEntrySG;     /* position stand entry side guide  */
                                /* [in x 10**2]                     */
  long          speed;          /* speed main drive [fpm]           */
  long          force;          /* roll force [ton]                 */
  long          exitThick;      /* stand exit thickness [in x 10**3]*/

  long          fwSlip;         /* forward slip  [% x 10**2]        */
  long          bwSlip;         /* backward slip [% x 10**2]        */
  long          stretch;        /* stretch [in x 10**3]             */
  long          rollWear;       /* roll wear [in x 10**3]           */
  long          thermCrown;     /* thermal crown [in x 10**3]       */
  long          asymFinValue;   /* asymptotic final value           */
                                /* [in x 10**3]                     */
  long          timeConstCrown;/* time constant thermal crown [s]  */

  long          looperAngle;    /* looper angle (for F6 empty) [deg]*/
  long          looperTension; /* spec tension (F6 empty) [deg]    */

} LV1_MsgFMsetupStand, *LV1_MsgFMsetupStandPtr;
```

2.2.8 FM - Stand Data

DSP no.: 243
Sender: HSM_L2
Receiver: HSM_MP4
Transmission Event: Operator on level 2 has completed roll change
Remarks: none

```
typedef struct                  /* message structure               */
{
  struct
  {
    long         rollDiaBRtop;  /* roll diameter backup roll top    */
                                /* [in x 10**2]                     */
    long         rollDia;       /* roll diameter work roll          */
                                /* [in x 10**3]                     */
    long         rollDiaBRbot;  /* roll diameter backup roll bottom */
                                /* [in x 10**2]                     */

  } stand[6];

} LV1_MsgFMstandData, *LV1_MsgFMstandDataPtr;
```

2.2.9 Analysis Data

2.2.9.1 Part 1

DSP no.: 244
Sender: HSM_L2
Receiver: HSM_MP4
Transmission Event: Furnace discharging
Remarks: none

```
typedef struct                  /* message structure                */
{
  long          slabId;         /* slab identification              */
  long          nomThick;       /* nominal thickn. cold [in x 10**3]*/
  union
  {
    long        l[2];           /* steel grade in longword format   */
    short       w[2];           /* steel grade in word format       */
    char        c[8];           /* steel grade in ASCII format      */
  } grade;
  long          estStripTemp;   /* estimated strip temperature [oF] */
  float         eleFe;          /* Fe [%]                           */
  float         eleC;           /* C  [%]                           */
  float         eleMn;          /* Mn [%]                           */
  float         eleP;           /* P  [%]                           */
  float         eleS;           /* S  [%]                           */
  float         eleSi;          /* Si [%]                           */
  float         eleCu;          /* Cu [%]                           */
  float         eleNi;          /* Ni [%]                           */
  float         eleCr;          /* Cr [%]                           */
  float         eleMo;          /* Mo [%]                           */
  float         eleSn;          /* Sn [%]                           */
  float         eleV;           /* V  [%]                           */
  float         eleAl;          /* Al [%]                           */
  float         elePb;          /* Pb [%]                           */
  long          numSteelGrade;  /* numeric steel grade              */

} LV1_MsgAnaDataP1, *LV1_MsgAnaDataP1Ptr;
```

2.2.9.2 Part 2

DSP no.: 245
Sender: HSM_L2
Receiver: HSM_MP4
Transmission Event: In continuation to Analysis Data Part 1
Remarks: none

```
typedef struct                  /* message structure                */
{
  float          eleCo;         /* Co [%]                           */
  float          eleZr;         /* Zr [%]                           */
  float          eleNb;         /* Nb [%]                           */
  float          eleCe;         /* Ce [%]                           */
  float          eleW;          /* W  [%]                           */
  float          eleTi;         /* Ti [%]                           */
  float          eleN2;         /* N2 [%]                           */

} LV1_MsgAnaDataP2, *LV1_MsgAnaDataP2Ptr;
```

2.2.10 Cooling Setup Data

DSP no.: 250
Sender: HSM_L2
Receiver: HSM_MP4
Transmission Event: - Furnace discharging
- Opertor pushed button “Send” at L2 MMI
Remarks: none

```
typedef struct                  /* message structure                */
{
  long        slabId;           /* slab identification              */
  long        tgtCoilTemp;      /* target coiling temperature [oF]  */
  long        coolPattern;      /* cooling pattern:                 */
                                /*   bit 2**0  spare                */
                                /*  Top cooling sprays:             */
                                /*   bit 2**1  section 1            */
                                /*   bit 2**2  section 2   Main     */
                                /*   bit 2**3  section 3  Cooling   */
                                /*   bit 2**4  section 4  Section   */
                                /*   bit 2**5  section 5            */
                                /*   bit 2**6  section 6            */
                                /*                                  */
                                /*   bit 2**7  section 7    Trim    */
                                /*   bit 2**8  section 8   Cooling  */
                                /*   bit 2**9  section 9   Section  */
                                /*   bit 2**10 section 10           */
                                /*                                  */
                                /*  Bottom cooling sprays:          */
                                /*   bit 2**11 section 1            */
                                /*   bit 2**12 section 2            */
                                /*   bit 2**13 section 3            */
                                /*   bit 2**14 section 4            */

  long        durCoolStartF2;   /* duration cool.start after F2 [s] */
  long        durCoolEndF2;     /* duration cool.end after F2 [s]   */

} LV1_MsgCoolSetup, *LV1_MsgCoolSetupPtr;
```

3. Transaction Description INTEL Link

3.1 General

This chapter specifies the messages which are exchanged between HSM Level 1 AGC (Automatic Gauge Control), realized on INTEL systems, and HSM Level 2 system.
The logical link and message transfer is based on TCP/IP.

3.2 Message Format

Messages have variable length and consist of a *Header Part* and a *Data Part*. The general message format is defined in figure 6 on next page.

3.2.1 Data Format

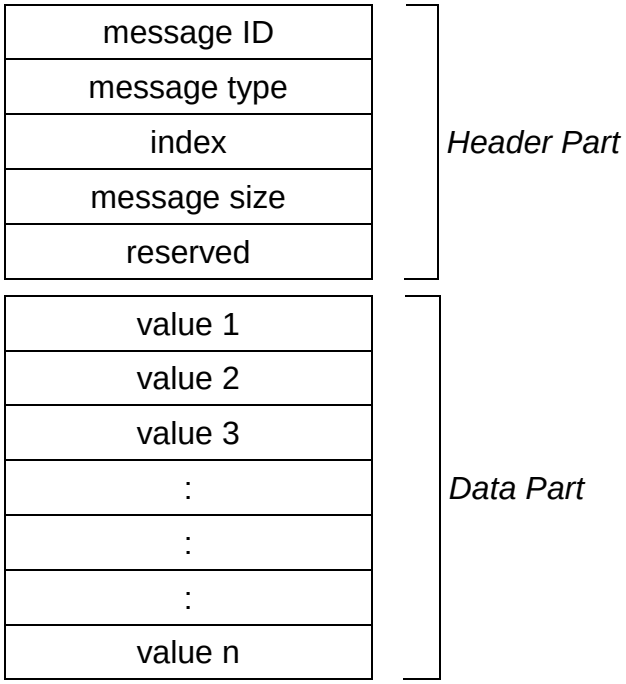
An .....ASCII representation of an integer with the length **n**

An.d .....ASCII representation of a float with total length **n** (decimal point included) and **d** digits behind decimal point:

Example: A8.2 = "00123.12"

Data values contain leading zeros.

Figure 6 - Message format INTEL link



Header Part:

message ID
format: A4
message identification

message type
format: A4
message type; specifies how the message contents has to be interpreted:
"0001" ... binary message
"0002" ... ASCII message
"0003" ... test message

index
format: A4
continuous message index
"0001" - "9999"

message size	format: A4 length of *Data Part* in byte
reserved	format: A4 reserved

Data Part:

value 1 - n	data values 1 to n contents and data format is described in chapter *Message Definitions*

3.3 Message Definitions

3.3.1 Measured Rolling Data FM

Message ID / Size: 0001 / 1272 Byte
Sender: AGC
Receiver: HSM_L2
Transmission Event: cyclically (200 ms), starting at signal *Strip in Mill*
Remarks: none

no.		min	max	format	explanation
1	-	1	6	A8	Stand number
2	-	100000	999999	A8	Slab ID
3	-	1	12	A8	*nBlocks* - Number of data blocks
					Following data will be repeated up to *nBlocks*:
4	-	1	99999	A8	Measurement sequence number
5	ft.	0.00	9999.99	A8.2	Strip location (0. for head)
6	ms	0	999999	A8	Delta time since strip in stand
7	in.	0.000	9.9999	A8.4	Load gap
8	in.	0.000	9.9999	A8.4	Screw down operator side
9	in.	0.000	9.9999	A8.4	Screw down drive side
10	fpm	0	9999	A8	Speed main drive
11	tons	0	6000	A8	Roll force operator side
12	tons	0	6000	A8	Roll force drive side
13		0	9999	A8	Roll torque
14	in.	0.000	9.9999	A8.4	X-Ray thickness (F6 only)
15	in.	0.000	9.9999	A8.4	Monitor feedback

16	-	0	11000000	A8	AGC info block (0/1): 00000000 ||||| ||||+ AGC overload reached |||| |||+- DMC gauge used ||| ||+-- WESTON gauge used || |+--- manual Gap change | +---- Monitor On/Off

3.3.2 FM Stretch Curve

Message ID / Size: 0002 / 1336 Byte
Sender: AGC
Receiver: HSM_L2
Transmission Event: - Measurement ready
- Stretch curve accepted by operator (at L1 MMI)
Remarks: none

no.		min	max	format	explanation
1	-	1	6	A8	Stand number
Following 5 items are repeated 28 times:					
2	-	1	255	A8	Setpoint number (value 255 terminates the list)
3	tons	0	6000	A8	Setpoint force center
4	in.	0.000	9.9999	A8.4	Setpoint position (average)
5	in.	0.000	9.9999	A8.4	Setpoint position operator side
6	in.	0.000	9.9999	A8.4	Setpoint position drive side
142	-	0	11000000	A8	AGC information: 00000000 || |+--- Bad calibration = 1 +---- Coeff. changed = 1
143	mil.	0.0	1.0	A16	Mill stretch coefficient 1
144	mil.	0.0	1.0	A16	Mill stretch coefficient 2
145	mil.	0.0	1.0	A16	Mill stretch coefficient 3
146	mil.	0.0	1.0	A16	Mill stretch coefficient 4
147	mil.	0.0	1.0	A16	Mill stretch coefficient 5
148	mil.	0.0	1.0	A16	Mill stretch coefficient 6
149	mil.	0.0	1.0	A16	Mill stretch coefficient 7
150	mil.	0.0	1.0	A16	Mill stretch coefficient 8
151	in.	0.0	9.9	A8.4	Zero point offset
152	in.	0.0	9.9	A8.4	Zero point offset OS
153	in.	0.0	9.9	A8.4	Zero point offset DS
154	mil/ton	0.0	99.9	A8.4	Slope
155	mil/ton	0.0	99.9	A8.4	Slope OS
156	mil/ton	0.0	99.9	A8.4	Slope DS
157	tons	0	999	A8.4	Force standard deviation
158	tons	0	999	A8.4	Force standard deviation OS

159	tons	0	999	A8.4	Force standard deviation DS

3.3.3 FM Stand Calibration

Message ID / Size: 0003 / 176 Byte
Sender: AGC
Receiver: HSM_L2
Transmission Event: Automatic calibration cycle completed
Remarks: none

no.		min	max	format	explanation
1	-	1	6	A8	Stand number
3	tons	0	6000	A8	Setpoint force center
4	in.	0.000	9.9999	A8.4	Setpoint position (average)
5	in.	0.000	9.9999	A8.4	Setpoint position operator side
6	in.	0.000	9.9999	A8.4	Setpoint position drive side
7	-	0	11000000	A8	AGC information: 00000000 || |+--- Bad calibration = 1 | +---- Coeff. changed = 1
8	mil.	0.0	1.0	A16	Mill stretch coefficient 1
9	mil.	0.0	1.0	A16	Mill stretch coefficient 2
10	mil.	0.0	1.0	A16	Mill stretch coefficient 3
11	mil.	0.0	1.0	A16	Mill stretch coefficient 4
12	mil.	0.0	1.0	A16	Mill stretch coefficient 5
13	mil.	0.0	1.0	A16	Mill stretch coefficient 6
14	mil.	0.0	1.0	A16	Mill stretch coefficient 7
15	mil.	0.0	1.0	A16	Mill stretch coefficient 8

4. Appendix

4.1 Receive Definition File

Following table defines all at Level 2 received DSP's.
The table is stored on node ***MSOHSM*** in the file
LV1$EXE:REC_DEFINE.HSM.

```
!
!=============================================================================================================================================
=
!
! File: REC_DEFINE.HSM              Date: 14-Jul-94 / Dop     Version: 1.7       Revised: 28-Jul-95 / Dvo        Page:  1 / 5
!
! Data Set Packet and Subscription Definition File for receiving data from ABB Level-1 Basic Automation System rolling Mill (HSM)
!
! For the interpretation of data, please refer to "ABB Link User's Manual"
!
!=============================================================================================================================================
=
!
! Definition of Hardware Environment:
! ===================================
!
! VAX_netw  VAX_node  ABB_netw
! ----------------------------
$  69        60        61
!                       |
!                       +-- Node 1 - HSM_MP1  - PLC Primary Edger
!                       +-- Node 2 - HSM_MP4  - PLC Finishing Mill
!                       +-- Node 3 - HSM_MP2  - PLC Roughing Mill 1
!                       +-- Node 4 - HSM_MP3  - PLC Roughing Mill 2
!                       +-- Node 7 - HSM_MP4A - PLC Communicaton    (GCOM card)
!
!
!
! Definition of Data Set Packets receiving from ABB L1-System:
! ============================================================
!
!        1         2         3         4         5         6         7         8         9         10        11        12        13
!234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
1
!--+--------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+-----------+--+
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |           |  |
!NO|Description of Data       |Nd|Name/IdentNo   |DD|T12|LEVEL-2 VARIABLE               |TR|Cvt.Val|CG|GR|BID1|BID2|BUFINS     |V|
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |           |  |
!##|                          |##|$$$$$$$$$$$$$$$|##|$$$|12345678901234567890           | $|#######|$$|##|####|####|$$$$$$$$$$$|$|
!--+--------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+-----------+--+
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |           |  |
!  | Tracking Event           |  |               |  |   |                               |  |       |  |  |    |    |           |  |
!  | ======================== |  |               |  |   |                               |  |       |  |  |    |    |           |  |
!  | DSP 200 / HSM_MP4        |  |               |  |   |                               |  |       |  |  |    |    |           |  |
!  | ------------------------ |  |               |  |   |                               |  |       |  |  |    |    |           |  |
001| Slab Id PE               | 2| 200           | 0|DLL|traSlabIdPE                    | C|      0|P | 1|1200|   0|           |X|
002| Slab Id RM               | 2| 200           | 1|DLL|traSlabIdRM                    | C|      0|  | 0|   0|   0|           |X|
003| Slab Id FM               | 2| 200           | 2|DLL|traSlabIdFM                    | C|      0|  | 0|   0|   0|           |X|
004| Tracking Bitmap          | 2| 200           | 3|DLL|traBitmap                      | C|      0|  | 0|   0|   0|           |X|
005| Tracking Event Code      | 2| 200           | 4|DLL|traEventCode                   | C|      0|  | 0|   0|   0|           |X|
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |           |  |
!--+--------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+-----------+--+
!
```

```
!
!2345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
1
!--+--------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+------------+-+
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |            | |
!NO|Description of Data       |Nd|Name/IdentNo   |DD|T12|LEVEL-2 VARIABLE               |TR|Cvt.Val|CG|GR|BID1|BID2|BUFINS      |V|
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |            | |
!##|                          |##|$$$$$$$$$$$$$$$|##|$$$|12345678901234567890           | $|#######|$$|##|####|####|$$$$$$$$$$$$|$|
!--+--------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+------------+-+
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | PE / Start of Rolling    |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ======================== |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 202 / HSM_MP1        |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ------------------------ |  |               |  |   |                               |  |       |  |  |    |    |            | |
006| Slab Id                  | 1| 202           | 0|DLL|PEStrtRolSlabId                | C|      0|P | 2|1202|   0|            |X|
007| Edger Adjust             | 1| 202           | 1|DLL|PEStrtRolEdgAdjust             | C|      0|  | 0|   0|   0|            |X|
008| Speed Primary Edger      | 1| 202           | 2|DLL|PEStrtRolSpeed                 | C|      0|  | 0|   0|   0|            |X|
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | PE / End   of Rolling    |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ======================== |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 203 / HSM_MP1        |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ------------------------ |  |               |  |   |                               |  |       |  |  |    |    |            | |
009| Slab Id                  | 1| 203           | 0|DLL|PEEndRolSlabId                 | C|      0|P | 2|1203|   0|            |X|
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | PE / Drive Status        |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ======================== |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 204 / HSM_MP1        |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ------------------------ |  |               |  |   |                               |  |       |  |  |    |    |            | |
010| Status of PE-Drive       | 1| 204           | 0|DLL|PEDriveStatus                  | C|      0|P | 2|1204|   0|            |X|
!  |                          |  |               |  |   |                               |  |       |  |  |    |    |            | |
!--+--------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+------------+-+
!
```

```
!
!2345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
1
!--+-------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+------------+-+
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!NO|Description of Data       |Nd|Name/IdentNo   |DD|T12|LEVEL-2 VARIABLE               |TR|Cvt.Val|CG|GR|BID1|BID2|BUFINS      |V|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!##|                         |##|$$$$$$$$$$$$$$$|##|$$$|12345678901234567890           | $|#######|$$|##|####|####|$$$$$$$$$$$$|$|
!--+-------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+------------+-+
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | RM / Start of Pass      |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ======================= |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 220 / HSM_MP2       |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                               |  |       |  |  |    |    |            | |
011| Slab Id                 | 3| 220           | 0|DLL|RMStrtPasSlabId                | C|      0|P | 2|1220|   0|            |X|
012| Pass Number             | 3| 220           | 1|DLL|RMStrtPasPasNo                 | C|      0|  | 0|   0|   0|            |X|
013| Blind/Active Pass 0/1   | 3| 220           | 2|DLL|RMStrtBlindActive              | C|      0|  | 0|   0|   0|            |X|
014| Last Pass Indicator 0/1 | 3| 220           | 3|DLL|RMStrtPasLastPas               | C|      0|  | 0|   0|   0|            |X|
015| Actual Edger Adjust     | 3| 220           | 4|DLL|RMStrtEdgAdjust                | C|      0|  | 0|   0|   0|            |X|
016| Actual Speed RMDT       | 3| 220           | 5|DLL|RMStrtSpeedRMDT                | C|      0|  | 0|   0|   0|            |X|
017| Roll cooling 0/1        | 3| 220           | 6|DLL|RMStrtRollCooling              | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | RM / Measured Pass Data |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ======================= |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 221 / HSM_MP2       |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                               |  |       |  |  |    |    |            | |
018| Slab Id                 | 3| 221           | 0|DLL|RMMeaPasSlabId                 | C|      0|P | 2|1221|   0|            |X|
019| Pass Number             | 3| 221           | 1|DLL|RMMeaPasPasNo                  | C|      0|  | 0|   0|   0|            |X|
020| Blind/Active Pass 0/1   | 3| 221           | 2|DLL|RMMeaPasBlindActive            | C|      0|  | 0|   0|   0|            |X|
021| Measurement Sequence No | 3| 221           | 3|DLL|RMMeaPasSeqNo                  | C|      0|  | 0|   0|   0|            |X|
022| Material Location       | 3| 221           | 4|DFF|RMMeaPasMatLoc                 | C|      0|  | 0|   0|   0|            |X|
023| Time from Start of Pass | 3| 221           | 5|DFF|RMMeaPasDur                    | C|      0|  | 0|   0|   0|            |X|
024| Material Temp Entry     | 3| 221           | 6|DLL|RMMeaPasTempEntry              | C|      0|  | 0|   0|   0|            |X|
025| Material Temp Delivery  | 3| 221           | 7|DLL|RMMeaPasTempDel                | C|      0|  | 0|   0|   0|            |X|
026| Roll Force Operator Side| 3| 221           | 8|DLL|RMMeaPasForceOS                | C|      0|  | 0|   0|   0|            |X|
027| Roll Force Drive Side   | 3| 221           | 9|DLL|RMMeaPasForceDS                | C|      0|  | 0|   0|   0|            |X|
028| Roll Torque             | 3| 221           |10|DLL|RMMeaPasTorque                 | C|      0|  | 0|   0|   0|            |X|
029| Rolling Speed           | 3| 221           |11|DLL|RMMeaPasSpeed                  | C|      0|  | 0|   0|   0|            |X|
030| Screw Down DS           | 3| 221           |12|DLL|RMMeaPasScrewDownDS            | C|      0|  | 0|   0|   0|            |X|
031| Screw Down OS           | 3| 221           |13|DLL|RMMeaPasScrewDownOS            | C|      0|  | 0|   0|   0|            |X|
032| Actual Edger Adjust     | 3| 221           |14|DLL|RMMeaPasEdgAdjust              | C|      0|  | 0|   0|   0|            |X|
033| Motor current           | 3| 221           |15|DFF|RMMeaPasCurrent                | C|      0|  | 0|   0|   0|            |X|
034| Motor volts             | 3| 221           |16|DFF|RMMeaPasVolt                   | C|      0|  | 0|   0|   0|            |X|
035| Descaling pressure      | 3| 221           |17|DFF|RMMeaPasDescPressure           | C|      0|  | 0|   0|   0|            |X|
036| Operation mode 0/1/2    | 3| 221           |18|DLL|RMMeaPasOperMode               | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | RM / End   Of Rolling   |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ======================= |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 222 / HSM_MP2       |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                               |  |       |  |  |    |    |            | |
037| Slab Id                 | 3| 222           | 0|DLL|RMEndRolSlabId                 | C|      0|P | 2|1222|   0|            |X|
038| Pass Number             | 3| 222           | 1|DLL|RMEndRolPasNo                  | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | General Info RM area    |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ======================= |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 224 / HSM_MP2       |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                               |  |       |  |  |    |    |            | |
039| Position Table Cover 1-4| 3| 224           | 0|DLL|posTableCover                  | C|      0|P | 1|1224|   0|            |X|
040| RM Descaler State       | 3| 224           | 1|DLL|descalerState                  | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
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!
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!
!2345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
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!  |                          |  |               |  |   |                                |  |       |  |  |    |    |            | |
!NO|Description of Data       |Nd|Name/IdentNo   |DD|T12|LEVEL-2 VARIABLE                |TR|Cvt.Val|CG|GR|BID1|BID2|BUFINS      |V|
!  |                          |  |               |  |   |                                |  |       |  |  |    |    |            | |
!##|                          |##|$$$$$$$$$$$$$$$|##|$$$|12345678901234567890            | $|#######|$$|##|####|####|$$$$$$$$$$$|$|
!--+--------------------------+--+---------------+--+---+--------------------------------+--+-------+--+--+----+----+------------+-+
!  |                          |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | FM / Start Of Rolling    |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | ======================== |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | DSP 237 / HSM_MP4        |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | ------------------------ |  |               |  |   |                                |  |       |  |  |    |    |            | |
041| Slab Id                  | 2| 237           | 0|DLL|FMStrtRolSlabId                 | C|      0|P | 3|1237|   0|            |X|
042| Descaling Bitmap PR      | 2| 237           | 1|DLL|FMStrtRolDescBitmap             | C|      0|  | 0|   0|   0|            |X|
043| Operation mode FM        | 2| 237           | 2|DLL|FMStrtRolOperMode               | C|      0|  | 0|   0|   0|            |X|
!  |                          |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | FM / End Of Rolling      |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | ======================== |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | DSP 238 / HSM_MP4        |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | ------------------------ |  |               |  |   |                                |  |       |  |  |    |    |            | |
044| Slab Id                  | 2| 238           | 0|DLL|FMEndRolSlabId                  | C|      0|P | 3|1238|   0|            |X|
045| Total Strip Length       | 2| 238           | 1|DFF|FMEndRolTotStripLen             | C|      0|  | 0|   0|   0|            |X|
046| Actual Cooling Pattern   | 2| 238           | 2|DLL|FMEndRolCoolPattern             | C|      0|  | 0|   0|   0|            |X|
047| Current limit reached    | 2| 238           | 3|DLL|FMEndRolCurLimitReached         | C|      0|  | 0|   0|   0|            |X|
048| Manual speed correction  | 2| 238           | 4|DLL|FMEndRolManualSpeedCorr         | C|      0|  | 0|   0|   0|            |X|
!  |                          |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | FM / Measured Entry Data |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | ======================== |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | DSP 239 / HSM_MP4        |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | ------------------------ |  |               |  |   |                                |  |       |  |  |    |    |            | |
049| Slab Id                  | 2| 239           | 0|DLL|FMMeaEntSlabId                  | C|      0|P | 3|1239|   0|            |X|
050| Measurement Sequence No  | 2| 239           | 1|DLL|FMMeaEntSeqNo                   | C|      0|  | 0|   0|   0|            |X|
051| Roller Table Speed       | 2| 239           | 2|DLL|FMMeaEntSpeedRT                 | C|      0|  | 0|   0|   0|            |X|
052| Time Since TB Head Pyrom | 2| 239           | 3|DFF|FMMeaEntTimePyr                 | C|      0|  | 0|   0|   0|            |X|
053| Actual Temp Of Segment   | 2| 239           | 4|DLL|FMMeaEntTemp                    | C|      0|  | 0|   0|   0|            |X|
!  |                          |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | FM / Rolling Exit Data   |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | ======================== |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | DSP 240 / HSM_MP4        |  |               |  |   |                                |  |       |  |  |    |    |            | |
!  | ------------------------ |  |               |  |   |                                |  |       |  |  |    |    |            | |
054| Slab Id                  | 2| 240           | 0|DLL|FMMeaExitSlabId                 | C|      0|P | 3|1240|   0|            |X|
055| Measurement Sequence No  | 2| 240           | 1|DLL|FMMeaExitSeqNo                  | C|      0|  | 0|   0|   0|            |X|
056| Strip Location           | 2| 240           | 2|DFF|FMMeaExitLocation               | C|      0|  | 0|   0|   0|            |X|
057| X-Ray Thickness          | 2| 240           | 3|DLL|FMMeaExitThick                  | C|      0|  | 0|   0|   0|            |X|
058| Width Gauge              | 2| 240           | 4|DLL|FMMeaExitWidth                  | C|      0|  | 0|   0|   0|            |X|
059| Temperature              | 2| 240           | 5|DLL|FMMeaExitTemp                   | C|      0|  | 0|   0|   0|            |X|
060| Strip Profile            | 2| 240           | 6|DLL|FMMeaExitProfile                | C|      0|  | 0|   0|   0|            |X|
061| Wedge                    | 2| 240           | 7|DLL|FMMeaExitWedge                  | C|      0|  | 0|   0|   0|            |X|
062| Edge Drop OS             | 2| 240           | 8|DLL|FMMeaExitEdgeDropOS             | C|      0|  | 0|   0|   0|            |X|
063| Edge Drop DS             | 2| 240           | 9|DLL|FMMeaExitEdgeDropDS             | C|      0|  | 0|   0|   0|            |X|
064| Centerline deviation     | 2| 240           |10|DLL|FMMeaExitDevCentLine            | C|      0|  | 0|   0|   0|            |X|
065| Shape factor             | 2| 240           |11|DFF|FMMeaExitShapeFactor            | C|      0|  | 0|   0|   0|            |X|
066| Delta time               | 2| 240           |12|DFF|FMMeaExitDelTime                | C|      0|  | 0|   0|   0|            |X|
!  |                          |  |               |  |   |                                |  |       |  |  |    |    |            | |
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!
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!--+-------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+------------+-+
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!NO|Description of Data       |Nd|Name/IdentNo   |DD|T12|LEVEL-2 VARIABLE               |TR|Cvt.Val|CG|GR|BID1|BID2|BUFINS      |V|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!##|                         |##|$$$$$$$$$$$$$$$|##|$$$|12345678901234567890           | $|#######|$$|##|####|####|$$$$$$$$$$$|$|
!--+-------------------------+--+---------------+--+---+-------------------------------+--+-------+--+--+----+----+------------+-+
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | FM / Rolling Finish Data |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ======================= |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 241 / HSM_MP4       |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                               |  |       |  |  |    |    |            | |
067| Slab Id                 | 2| 241           | 0|DLL|FMMeaFinSlabId                 | C|      0|P | 3|1241|   0|            |X|
068| Measurement Sequence No | 2| 241           | 1|DLL|FMMeaFinSeqNo                  | C|      0|  | 0|   0|   0|            |X|
069| Strip Location          | 2| 241           | 2|DFF|FMMeaFinLocation               | C|      0|  | 0|   0|   0|            |X|
070| Temperature             | 2| 241           | 3|DLL|FMMeaFinTemp                   | C|      0|  | 0|   0|   0|            |X|
071| Delta time              | 2| 241           | 4|DFF|FMMeaFinDelTime                | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | FM / Measured Stand Data |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ======================= |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 191 (F1)/ HSM_MP4   |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                               |  |       |  |  |    |    |            | |
072| Slab Id                 | 2| 191           | 0|DLL|FMMeaStandF1SlabId             | C|      0|P | 3|1191|   0|            |X|
073| Measurement Sequence No | 2| 191           | 1|DLL|FMMeaStandF1SeqNo              | C|      0|  | 0|   0|   0|            |X|
074| Delta time              | 2| 191           | 2|DFF|FMMeaStandF1DelTime            | C|      0|  | 0|   0|   0|            |X|
075| Current                 | 2| 191           | 3|DFF|FMMeaStandF1Current            | C|      0|  | 0|   0|   0|            |X|
076| Volt                    | 2| 191           | 4|DFF|FMMeaStandF1Volt               | C|      0|  | 0|   0|   0|            |X|
077| Looper Angle            | 2| 191           | 5|DFF|FMMeaStandF1LooperAngle        | C|      0|  | 0|   0|   0|            |X|
078| Rolling Speed           | 2| 191           | 6|DFF|FMMeaStandF1Speed              | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 192 (F2)/ HSM_MP4   |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                               |  |       |  |  |    |    |            | |
079| Slab Id                 | 2| 192           | 0|DLL|FMMeaStandF2SlabId             | C|      0|P | 3|1192|   0|            |X|
080| Measurement Sequence No | 2| 192           | 1|DLL|FMMeaStandF2SeqNo              | C|      0|  | 0|   0|   0|            |X|
081| Delta time              | 2| 192           | 2|DFF|FMMeaStandF2DelTime            | C|      0|  | 0|   0|   0|            |X|
082| Current                 | 2| 192           | 3|DFF|FMMeaStandF2Current            | C|      0|  | 0|   0|   0|            |X|
083| Volt                    | 2| 192           | 4|DFF|FMMeaStandF2Volt               | C|      0|  | 0|   0|   0|            |X|
084| Looper Angle            | 2| 192           | 5|DFF|FMMeaStandF2LooperAngle        | C|      0|  | 0|   0|   0|            |X|
085| Rolling Speed           | 2| 192           | 6|DFF|FMMeaStandF2Speed              | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | DSP 192 (F3)/ HSM_MP4   |  |               |  |   |                               |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                               |  |       |  |  |    |    |            | |
086| Slab Id                 | 2| 193           | 0|DLL|FMMeaStandF3SlabId             | C|      0|P | 3|1193|   0|            |X|
087| Measurement Sequence No | 2| 193           | 1|DLL|FMMeaStandF3SeqNo              | C|      0|  | 0|   0|   0|            |X|
088| Delta time              | 2| 193           | 2|DFF|FMMeaStandF3DelTime            | C|      0|  | 0|   0|   0|            |X|
089| Current                 | 2| 193           | 3|DFF|FMMeaStandF3Current            | C|      0|  | 0|   0|   0|            |X|
090| Volt                    | 2| 193           | 4|DFF|FMMeaStandF3Volt               | C|      0|  | 0|   0|   0|            |X|
091| Looper Angle            | 2| 193           | 5|DFF|FMMeaStandF3LooperAngle        | C|      0|  | 0|   0|   0|            |X|
092| Rolling Speed           | 2| 193           | 6|DFF|FMMeaStandF3Speed              | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                               |  |       |  |  |    |    |            | |
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!
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!  |                         |  |               |  |   |                             |  |       |  |  |    |    |            | |
!NO|Description of Data      |Nd|Name/IdentNo   |DD|T12|LEVEL-2 VARIABLE             |TR|Cvt.Val|CG|GR|BID1|BID2|BUFINS      |V|
!  |                         |  |               |  |   |                             |  |       |  |  |    |    |            | |
!##|                         |##|$$$$$$$$$$$$$$$|##|$$$|12345678901234567890         | $|#######|$$|##|####|####|$$$$$$$$$$$$|$|
!--+-------------------------+--+---------------+--+---+-----------------------------+--+-------+--+--+----+----+------------+-+
!  |                         |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | DSP 194 (F4)/ HSM_MP4   |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                             |  |       |  |  |    |    |            | |
093| Slab Id                 | 2| 194           | 0|DLL|FMMeaStandF4SlabId           | C|      0|P | 3|1194|   0|            |X|
094| Measurement Sequence No | 2| 194           | 1|DLL|FMMeaStandF4SeqNo            | C|      0|  | 0|   0|   0|            |X|
095| Delta time              | 2| 194           | 2|DFF|FMMeaStandF4DelTime          | C|      0|  | 0|   0|   0|            |X|
096| Current                 | 2| 194           | 3|DFF|FMMeaStandF4Current          | C|      0|  | 0|   0|   0|            |X|
097| Volt                    | 2| 194           | 4|DFF|FMMeaStandF4Volt             | C|      0|  | 0|   0|   0|            |X|
098| Looper Angle            | 2| 194           | 5|DFF|FMMeaStandF4LooperAngle      | C|      0|  | 0|   0|   0|            |X|
099| Rolling Speed           | 2| 194           | 6|DFF|FMMeaStandF4Speed            | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | DSP 195 (F5)/ HSM_MP4   |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                             |  |       |  |  |    |    |            | |
100| Slab Id                 | 2| 195           | 0|DLL|FMMeaStandF5SlabId           | C|      0|P | 3|1195|   0|            |X|
101| Measurement Sequence No | 2| 195           | 1|DLL|FMMeaStandF5SeqNo            | C|      0|  | 0|   0|   0|            |X|
102| Delta time              | 2| 195           | 2|DFF|FMMeaStandF5DelTime          | C|      0|  | 0|   0|   0|            |X|
103| Current                 | 2| 195           | 3|DFF|FMMeaStandF5Current          | C|      0|  | 0|   0|   0|            |X|
104| Volt                    | 2| 195           | 4|DFF|FMMeaStandF5Volt             | C|      0|  | 0|   0|   0|            |X|
105| Looper Angle            | 2| 195           | 5|DFF|FMMeaStandF5LooperAngle      | C|      0|  | 0|   0|   0|            |X|
106| Rolling Speed           | 2| 195           | 6|DFF|FMMeaStandF5Speed            | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | DSP 196 (F6)/ HSM_MP4   |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                             |  |       |  |  |    |    |            | |
107| Slab Id                 | 2| 196           | 0|DLL|FMMeaStandF6SlabId           | C|      0|P | 3|1196|   0|            |X|
108| Measurement Sequence No | 2| 196           | 1|DLL|FMMeaStandF6SeqNo            | C|      0|  | 0|   0|   0|            |X|
109| Delta time              | 2| 196           | 2|DFF|FMMeaStandF6DelTime          | C|      0|  | 0|   0|   0|            |X|
110| Current                 | 2| 196           | 3|DFF|FMMeaStandF6Current          | C|      0|  | 0|   0|   0|            |X|
111| Volt                    | 2| 196           | 4|DFF|FMMeaStandF6Volt             | C|      0|  | 0|   0|   0|            |X|
112| Looper Angle            | 2| 196           | 5|DFF|FMMeaStandF6LooperAngle      | C|      0|  | 0|   0|   0|            |X|
113| Rolling Speed           | 2| 196           | 6|DFF|FMMeaStandF6Speed            | C|      0|  | 0|   0|   0|            |X|
!  |                         |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  |                         |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | FM / State Change       |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | ======================= |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | DSP 246 / HSM_MP4       |  |               |  |   |                             |  |       |  |  |    |    |            | |
!  | ----------------------- |  |               |  |   |                             |  |       |  |  |    |    |            | |
114| Actual State Bitmap     | 2| 246           | 0|DLL|FMstateMap                   | C|      0|P | 3|1246|   0|            |X|
!  |                         |  |               |  |   |                             |  |       |  |  |    |    |            | |
!--+-------------------------+--+---------------+--+---+-----------------------------+--+-------+--+--+----+----+------------+-+
```

4.2 Send Definition File

Following table defines all from Level 2 sent DSP's.
The table is stored on node ***MSOHSM*** in the file
LV1$EXE:SND_DEFINE.HSM.

```
!
!=============================================================================================================================================
=
!
! File: SND_DEFINE.HSM           Date: 28-Jun-94 / Dop     Version: 1.4          Revised: 01-JUL-95 / Dop       Page:  1 / 2
!
! Data Set Packets Definition File for sending data from Automation System of rolling mill (HSM) to ABB Level-1 Basic
!
! For the interpretation of data, please refer to "ABB Link User's Manual"
!
!=============================================================================================================================================
=
!
! Definition of Hardware Environment:
! ===================================
!
! VAX_netw  VAX_node  ABB_netw
! ----------------------------
!  69        60        61
!                       |
!                       +-- Node 1 - HSM_MP1  - PLC Primary Edger
!                       +-- Node 2 - HSM_MP4  - PLC Finishing Mill
!                       +-- Node 3 - HSM_MP2  - PLC Roughing Mill 1
!                       +-- Node 4 - HSM_MP3  - PLC Roughing Mill 2
!                       +-- Node 7 - HSM_MP4A - PLC Communicaton    (GCOM card)
!
!        1         2         3         4         5         6         7         8         9         10        11        12        13
!2345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
!--+--------------------+----+------+------+------+-----------------------------------------------------------------------------+------
!NO|Description of Data | MSG|L1ID 1|L1ID 2|L1ID 3|L2T/L1T   4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24|Spare
!  |                    |$$$$|## ###|## ###|## ###|## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ##|
!--+--------------------+----+------+------+------+-----------------------------------------------------------------------------+------
!  |                    |    |      |      |      |                                                                             |
001| Level 2 Watchdog   |1255|2  255| 0   0| 0   0|LL LL LL LL                                                                  |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
002| Setup Data PE      |1201|1  201| 0   0| 0   0|LL FF LL LL LL                                                               |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
003| Stand Data PE      |1205|1  205| 0   0| 0   0|LL                                                                           |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
004| Setup Data RM Head |1210|3  210| 0   0| 0   0|LL LL FF LL LL LL LL LL LL LL                                                |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
!  | Setup Data RM Pass |    |      |      |      |                                                                             |
!  | ------------------ |    |      |      |      |                                                                             |
005| Pass 1             |1211|3  211| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL                                                |
006| Pass 2             |1212|3  212| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL                                                |
007| Pass 3             |1213|3  213| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL                                                |
008| Pass 4             |1214|3  214| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL                                                |
009| Pass 5             |1215|3  215| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL                                                |
010| Pass 6             |1216|3  216| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL                                                |
011| Pass 7             |1217|3  217| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL                                                |
012| Pass 8             |1218|3  218| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL                                                |
013| Pass 9             |1219|3  219| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL                                                |
!  |                    |    |      |      |      |                                                                             |
014| Stand Data RM      |1223|3  223| 0   0| 0   0|LL LL                                                                        |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
!--+--------------------+----+------+------+------+-----------------------------------------------------------------------------+------
!
```

```
!=============================================================================================================================================
=
!
! File: SND_DEFINE.HSM           Date: 28-Jun-94 / Dop     Version: 1.0         Revised: 07-Jun-94 / Dop       Page:  2 / 2
!
! Data Set Packets Definition File for sending data from Automation System of rolling mill (HSM) to ABB Level-1 Basic
!
! For the interpretation of data, please refer to "ABB Link User's Manual"
!
!=============================================================================================================================================
=
!
!       1         2         3         4         5         6         7         8         9         10        11        12        13
!2345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
!--+--------------------+----+------+------+------+-----------------------------------------------------------------------------+------
!NO|Description of Data | MSG|L1ID 1|L1ID 2|L1ID 3|L2T/L1T   4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24|Spare
!  |                    |$$$$|## ###|## ###|## ###|## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ## ##|
!--+--------------------+----+------+------+------+-----------------------------------------------------------------------------+------
!  |                    |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
015| Setup Data FM Head |1230|2  230| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL LL LL LL LL LL LL LL                           |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
!  | Setup Data FM Stand|    |      |      |      |                                                                             |
!  | ------------------ |    |      |      |      |                                                                             |
016| Stand F1           |1231|2  231| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL LL LL LL                                       |
017| Stand F2           |1232|2  232| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL LL LL LL                                       |
018| Stand F3           |1233|2  233| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL LL LL LL                                       |
019| Stand F4           |1234|2  234| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL LL LL LL                                       |
020| Stand F5           |1235|2  235| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL LL LL LL                                       |
021| Stand F6           |1236|2  236| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL LL LL LL                                       |
!  |                    |    |      |      |      |                                                                             |
022| Stand Data FM      |1243|2  243| 0   0| 0   0|LL LL LL LL LL LL LL LL LL LL LL LL LL LL LL LL LL LL LL                     |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
023| Analysis Data 1    |1244|2  244| 0   0| 0   0|LL LL LL LL LL FF FF FF FF FF FF FF FF FF FF FF FF FF FF LL                  |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
024| Analysis Data 2    |1245|2  245| 0   0| 0   0|FF FF FF FF FF FF FF                                                         |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
025| Cooling Setup Data |1250|2  250| 0   0| 0   0|LL LL LL LL LL                                                               |
!  | ------------------ |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
026| Alarm Message      |1254|2  254| 0   0| 0   0|LL                                                                           |
!  | -------------      |    |      |      |      |                                                                             |
!  |                    |    |      |      |      |                                                                             |
!--+--------------------+----+------+------+------+-----------------------------------------------------------------------------+------
```

5. Revision and Document Distribution List

REVISION LIST

Date	Version	Author	Description
95-Aug-28	V1.0	F.Dvo.	first draft
95-Sep-04	V1.1	F.Dvo.	revision
96-Feb-28	as built	F.Dvo.	as built

DISTRIBUTION LIST

Version	Receiver
V1.0	VAI / H. Beer
V1.1	VAI / H. Beer
as built	ARMCO