

**SUPER 286**  
**ACT CHIP**  
**USER'S MANUAL**

CONTENTS

1. INTRODUCTION

2. FEATURES

3. SYSTEM REQUIREMENTS

4. CONNECTOR ASSIGNMENTS

5. FULLY PROGRAMMED

6. APPENDIX

7. INDEX

8. GLOSSARY

9. WARRANTY

10. CONTACT INFORMATION

11. LEGAL INFORMATION

12. NOTES

13. REVISIONS

14. ACKNOWLEDGMENTS

15. ABOUT THIS MANUAL

16. CONTACT INFORMATION

17. LEGAL INFORMATION

18. NOTES

19. REVISIONS

20. ACKNOWLEDGMENTS

21. ABOUT THIS MANUAL

22. CONTACT INFORMATION

23. LEGAL INFORMATION

24. NOTES

25. REVISIONS

26. ACKNOWLEDGMENTS

27. ABOUT THIS MANUAL

28. CONTACT INFORMATION

29. LEGAL INFORMATION

30. NOTES

31. REVISIONS

32. ACKNOWLEDGMENTS

33. ABOUT THIS MANUAL

34. CONTACT INFORMATION

35. LEGAL INFORMATION

36. NOTES

37. REVISIONS

38. ACKNOWLEDGMENTS

39. ABOUT THIS MANUAL

40. CONTACT INFORMATION

41. LEGAL INFORMATION

42. NOTES

43. REVISIONS

44. ACKNOWLEDGMENTS

45. ABOUT THIS MANUAL

46. CONTACT INFORMATION

47. LEGAL INFORMATION

48. NOTES

49. REVISIONS

50. ACKNOWLEDGMENTS

51. ABOUT THIS MANUAL

52. CONTACT INFORMATION

53. LEGAL INFORMATION

54. NOTES

55. REVISIONS

56. ACKNOWLEDGMENTS

57. ABOUT THIS MANUAL

58. CONTACT INFORMATION

59. LEGAL INFORMATION

60. NOTES

61. REVISIONS

62. ACKNOWLEDGMENTS

63. ABOUT THIS MANUAL

64. CONTACT INFORMATION

65. LEGAL INFORMATION

66. NOTES

67. REVISIONS

68. ACKNOWLEDGMENTS

69. ABOUT THIS MANUAL

70. CONTACT INFORMATION

71. LEGAL INFORMATION

72. NOTES

73. REVISIONS

74. ACKNOWLEDGMENTS

75. ABOUT THIS MANUAL

76. CONTACT INFORMATION

77. LEGAL INFORMATION

78. NOTES

79. REVISIONS

80. ACKNOWLEDGMENTS

81. ABOUT THIS MANUAL

82. CONTACT INFORMATION

83. LEGAL INFORMATION

84. NOTES

85. REVISIONS

86. ACKNOWLEDGMENTS

87. ABOUT THIS MANUAL

88. CONTACT INFORMATION

89. LEGAL INFORMATION

90. NOTES

91. REVISIONS

92. ACKNOWLEDGMENTS

93. ABOUT THIS MANUAL

94. CONTACT INFORMATION

95. LEGAL INFORMATION

96. NOTES

97. REVISIONS

98. ACKNOWLEDGMENTS

99. ABOUT THIS MANUAL

100. CONTACT INFORMATION

101. LEGAL INFORMATION

102. NOTES

103. REVISIONS

104. ACKNOWLEDGMENTS

105. ABOUT THIS MANUAL

106. CONTACT INFORMATION

107. LEGAL INFORMATION

108. NOTES

109. REVISIONS

110. ACKNOWLEDGMENTS

111. ABOUT THIS MANUAL

112. CONTACT INFORMATION

113. LEGAL INFORMATION

114. NOTES

115. REVISIONS

116. ACKNOWLEDGMENTS

117. ABOUT THIS MANUAL

118. CONTACT INFORMATION

119. LEGAL INFORMATION

120. NOTES

121. REVISIONS

122. ACKNOWLEDGMENTS

123. ABOUT THIS MANUAL

124. CONTACT INFORMATION

125. LEGAL INFORMATION

126. NOTES

127. REVISIONS

128. ACKNOWLEDGMENTS

129. ABOUT THIS MANUAL

130. CONTACT INFORMATION

131. LEGAL INFORMATION

132. NOTES

133. REVISIONS

134. ACKNOWLEDGMENTS

135. ABOUT THIS MANUAL

136. CONTACT INFORMATION

137. LEGAL INFORMATION

138. NOTES

139. REVISIONS

140. ACKNOWLEDGMENTS

141. ABOUT THIS MANUAL

142. CONTACT INFORMATION

143. LEGAL INFORMATION

144. NOTES

145. REVISIONS

146. ACKNOWLEDGMENTS

147. ABOUT THIS MANUAL

148. CONTACT INFORMATION

149. LEGAL INFORMATION

150. NOTES

151. REVISIONS

152. ACKNOWLEDGMENTS

153. ABOUT THIS MANUAL

154. CONTACT INFORMATION

155. LEGAL INFORMATION

156. NOTES

157. REVISIONS

158. ACKNOWLEDGMENTS

159. ABOUT THIS MANUAL

160. CONTACT INFORMATION

161. LEGAL INFORMATION

162. NOTES

163. REVISIONS

164. ACKNOWLEDGMENTS

165. ABOUT THIS MANUAL

166. CONTACT INFORMATION

167. LEGAL INFORMATION

168. NOTES

169. REVISIONS

170. ACKNOWLEDGMENTS

171. ABOUT THIS MANUAL

172. CONTACT INFORMATION

173. LEGAL INFORMATION

174. NOTES

175. REVISIONS

176. ACKNOWLEDGMENTS

177. ABOUT THIS MANUAL

178. CONTACT INFORMATION

179. LEGAL INFORMATION

180. NOTES

181. REVISIONS

182. ACKNOWLEDGMENTS

183. ABOUT THIS MANUAL

184. CONTACT INFORMATION

185. LEGAL INFORMATION

186. NOTES

187. REVISIONS

188. ACKNOWLEDGMENTS

189. ABOUT THIS MANUAL

190. CONTACT INFORMATION

191. LEGAL INFORMATION

192. NOTES

193. REVISIONS

194. ACKNOWLEDGMENTS

195. ABOUT THIS MANUAL

196. CONTACT INFORMATION

197. LEGAL INFORMATION

198. NOTES

199. REVISIONS

200. ACKNOWLEDGMENTS

201. ABOUT THIS MANUAL

202. CONTACT INFORMATION

203. LEGAL INFORMATION

204. NOTES

205. REVISIONS

206. ACKNOWLEDGMENTS

207. ABOUT THIS MANUAL

208. CONTACT INFORMATION

209. LEGAL INFORMATION

210. NOTES

211. REVISIONS

212. ACKNOWLEDGMENTS

213. ABOUT THIS MANUAL

214. CONTACT INFORMATION

215. LEGAL INFORMATION

216. NOTES

217. REVISIONS

218. ACKNOWLEDGMENTS

219. ABOUT THIS MANUAL

220. CONTACT INFORMATION

221. LEGAL INFORMATION

222. NOTES

223. REVISIONS

224. ACKNOWLEDGMENTS

225. ABOUT THIS MANUAL

226. CONTACT INFORMATION

227. LEGAL INFORMATION

228. NOTES

229. REVISIONS

230. ACKNOWLEDGMENTS

231. ABOUT THIS MANUAL

232. CONTACT INFORMATION

233. LEGAL INFORMATION

234. NOTES

235. REVISIONS

236. ACKNOWLEDGMENTS

237. ABOUT THIS MANUAL

238. CONTACT INFORMATION

239. LEGAL INFORMATION

240. NOTES

241. REVISIONS

242. ACKNOWLEDGMENTS

243. ABOUT THIS MANUAL

244. CONTACT INFORMATION

245. LEGAL INFORMATION

246. NOTES

247. REVISIONS

248. ACKNOWLEDGMENTS

249. ABOUT THIS MANUAL

250. CONTACT INFORMATION

251. LEGAL INFORMATION

252. NOTES

253. REVISIONS

254. ACKNOWLEDGMENTS

255. ABOUT THIS MANUAL

256. CONTACT INFORMATION

257. LEGAL INFORMATION

258. NOTES

259. REVISIONS

260. ACKNOWLEDGMENTS

261. ABOUT THIS MANUAL

262. CONTACT INFORMATION

263. LEGAL INFORMATION

264. NOTES

265. REVISIONS

266. ACKNOWLEDGMENTS

267. ABOUT THIS MANUAL

268. CONTACT INFORMATION

269. LEGAL INFORMATION

270. NOTES

271. REVISIONS

272. ACKNOWLEDGMENTS

273. ABOUT THIS MANUAL

274. CONTACT INFORMATION

275. LEGAL INFORMATION

276. NOTES

277. REVISIONS

278. ACKNOWLEDGMENTS

279. ABOUT THIS MANUAL

280. CONTACT INFORMATION

281. LEGAL INFORMATION

282. NOTES

283. REVISIONS

284. ACKNOWLEDGMENTS

285. ABOUT THIS MANUAL

286. CONTACT INFORMATION

287. LEGAL INFORMATION

288. NOTES

289. REVISIONS

290. ACKNOWLEDGMENTS

291. ABOUT THIS MANUAL

292. CONTACT INFORMATION

293. LEGAL INFORMATION

294. NOTES

295. REVISIONS

296. ACKNOWLEDGMENTS

297. ABOUT THIS MANUAL

298. CONTACT INFORMATION

299. LEGAL INFORMATION

300. NOTES

301. REVISIONS

302. ACKNOWLEDGMENTS

303. ABOUT THIS MANUAL

304. CONTACT INFORMATION

305. LEGAL INFORMATION

306. NOTES

307. REVISIONS

308. ACKNOWLEDGMENTS

309. ABOUT THIS MANUAL

310. CONTACT INFORMATION

311. LEGAL INFORMATION

312. NOTES

313. REVISIONS

314. ACKNOWLEDGMENTS

315. ABOUT THIS MANUAL

316. CONTACT INFORMATION

317. LEGAL INFORMATION

318. NOTES

319. REVISIONS

320. ACKNOWLEDGMENTS

321. ABOUT THIS MANUAL

322. CONTACT INFORMATION

323. LEGAL INFORMATION

324. NOTES

325. REVISIONS

326. ACKNOWLEDGMENTS

327. ABOUT THIS MANUAL

328. CONTACT INFORMATION

329. LEGAL INFORMATION

330. NOTES

331. REVISIONS

332. ACKNOWLEDGMENTS

333. ABOUT THIS MANUAL

334. CONTACT INFORMATION

335. LEGAL INFORMATION

336. NOTES

337. REVISIONS

338. ACKNOWLEDGMENTS

339. ABOUT THIS MANUAL

340. CONTACT INFORMATION

341. LEGAL INFORMATION

342. NOTES

343. REVISIONS

344. ACKNOWLEDGMENTS

345. ABOUT THIS MANUAL

346. CONTACT INFORMATION

347. LEGAL INFORMATION

348. NOTES

349. REVISIONS

350. ACKNOWLEDGMENTS

351. ABOUT THIS MANUAL

352. CONTACT INFORMATION

353. LEGAL INFORMATION

354. NOTES

355. REVISIONS

356. ACKNOWLEDGMENTS

357. ABOUT THIS MANUAL

358. CONTACT INFORMATION

359. LEGAL INFORMATION

360. NOTES

361. REVISIONS

362. ACKNOWLEDGMENTS

363. ABOUT THIS MANUAL

364. CONTACT INFORMATION

365. LEGAL INFORMATION

366. NOTES

367. REVISIONS

368. ACKNOWLEDGMENTS

369. ABOUT THIS MANUAL

370. CONTACT INFORMATION

371. LEGAL INFORMATION

372. NOTES

373. REVISIONS

374. ACKNOWLEDGMENTS

375. ABOUT THIS MANUAL

376. CONTACT INFORMATION

377. LEGAL INFORMATION

378. NOTES

379. REVISIONS

380. ACKNOWLEDGMENTS

381. ABOUT THIS MANUAL

382. CONTACT INFORMATION

383. LEGAL INFORMATION

384. NOTES

385. REVISIONS

386. ACKNOWLEDGMENTS

387. ABOUT THIS MANUAL

388. CONTACT INFORMATION

389. LEGAL INFORMATION

390. NOTES

391. REVISIONS

392. ACKNOWLEDGMENTS

393. ABOUT THIS MANUAL

394. CONTACT INFORMATION

395. LEGAL INFORMATION

396. NOTES

397. REVISIONS

398. ACKNOWLEDGMENTS

399. ABOUT THIS MANUAL

400. CONTACT INFORMATION

401. LEGAL INFORMATION

402. NOTES

403. REVISIONS

404. ACKNOWLEDGMENTS

405. ABOUT THIS MANUAL

406. CONTACT INFORMATION

407. LEGAL INFORMATION

408. NOTES

409. REVISIONS

410. ACKNOWLEDGMENTS

411. ABOUT THIS MANUAL

412. CONTACT INFORMATION

413. LEGAL INFORMATION

414. NOTES

415. REVISIONS

416. ACKNOWLEDGMENTS

417. ABOUT THIS MANUAL

418. CONTACT INFORMATION

419. LEGAL INFORMATION

420. NOTES

421. REVISIONS

422. ACKNOWLEDGMENTS

423. ABOUT THIS MANUAL

424. CONTACT INFORMATION

425. LEGAL INFORMATION

426. NOTES

427. REVISIONS

428. ACKNOWLEDGMENTS

429. ABOUT THIS MANUAL

430. CONTACT INFORMATION

431. LEGAL INFORMATION

432. NOTES

433. REVISIONS

434. ACKNOWLEDGMENTS

435. ABOUT THIS MANUAL

436. CONTACT INFORMATION

437. LEGAL INFORMATION

438. NOTES

439. REVISIONS

440. ACKNOWLEDGMENTS

441. ABOUT THIS MANUAL

442. CONTACT INFORMATION

443. LEGAL INFORMATION

444. NOTES

445. REVISIONS

446. ACKNOWLEDGMENTS

447. ABOUT THIS MANUAL

448. CONTACT INFORMATION

449. LEGAL INFORMATION

450. NOTES

451. REVISIONS

452. ACKNOWLEDGMENTS

453. ABOUT THIS MANUAL

454. CONTACT INFORMATION

455. LEGAL INFORMATION

456. NOTES

457. REVISIONS

458. ACKNOWLEDGMENTS

459. ABOUT THIS MANUAL

460. CONTACT INFORMATION

461. LEGAL INFORMATION

462. NOTES

463. REVISIONS

464. ACKNOWLEDGMENTS

465. ABOUT THIS MANUAL

466. CONTACT INFORMATION

467. LEGAL INFORMATION

468. NOTES

469. REVISIONS

470. ACKNOWLEDGMENTS

471. ABOUT THIS MANUAL

472. CONTACT INFORMATION

473. LEGAL INFORMATION

474. NOTES

475. REVISIONS

476. ACKNOWLEDGMENTS

477. ABOUT THIS MANUAL

478. CONTACT INFORMATION

479. LEGAL INFORMATION

480. NOTES

481. REVISIONS

482. ACKNOWLEDGMENTS

483. ABOUT THIS MANUAL

484. CONTACT INFORMATION

485. LEGAL INFORMATION

486. NOTES

487. REVISIONS

488. ACKNOWLEDGMENTS

489. ABOUT THIS MANUAL

490. CONTACT INFORMATION

491. LEGAL INFORMATION

492. NOTES

493. REVISIONS

494. ACKNOWLEDGMENTS

495. ABOUT THIS MANUAL

496. CONTACT INFORMATION

497. LEGAL INFORMATION

498. NOTES

499. REVISIONS

500. ACKNOWLEDGMENTS

## CONTENTS

1. INTRODUCTION
  - 1.1 CHECK LIST
  - 1.2 LAYOUT OF THE SYSTEM BOARD
  - 1.3 INSTALLATION OF THE SYSTEM BOARD
2. FEATURES
  - 2.1 CPU
  - 2.2 RAM
  - 2.3 RAM SPEED
  - 2.4 ROM SUBSYSTEM
  - 2.5 COPROCESSOR
  - 2.6 SYSTEM TIMER
  - 2.7 SYSTEM INTERRUPTS
  - 2.8 DMA
  - 2.9 REAL TIME CLOCK
  - 2.10 KEYBOARD CONTROLLER
  - 2.11 I/O SLOTS
3. DIP SWITCH AND JUMPER SETTINGS
  - 3.1 SW1 - RAM SIZE AND WAIT STATE
  - 3.2 JP20 - RAM PARITY SELECTION
  - 3.3 JP6 - ROM SIZE SELECTION
  - 3.4 JP9 - DISPLAY TYPE SELECTION
  - 3.5 JP12 - BATTERY SELECTION
  - 3.6 JP13 - POWER GOOD SELECTION
  - 3.7 JP17 - SPEED OF I/O SLOTS
4. CONNECTOR PIN ASSIGNMENTS
  - 4.1 JP1 - POWER CONNECTOR
  - 4.2 JP5 - KEYBOARD CONNECTOR
  - 4.3 JP11 - EXTERNAL BATTERY CONNECTOR
  - 4.4 JP10 - RESET CONNECTOR
  - 4.5 JP2 - TURBO LED CONNECTOR
  - 4.6 JP14 - SPEAKER CONNECTOR
  - 4.7 JP7 - POWER LED AND KEYBOARD LOCK CONNECTOR
  - 4.8 JP19 - TURBO SWITCH CONNECTOR
  - 4.9 JP27 - JP39 - I/O SLOTS
5. UTILITY PROGRAMS
  - 5.1 SATSW
  - 5.2 SHADOW
  - 5.3 EMS DRIVER

## 1. INTRODUCTION

### 1.1 CHECK LIST

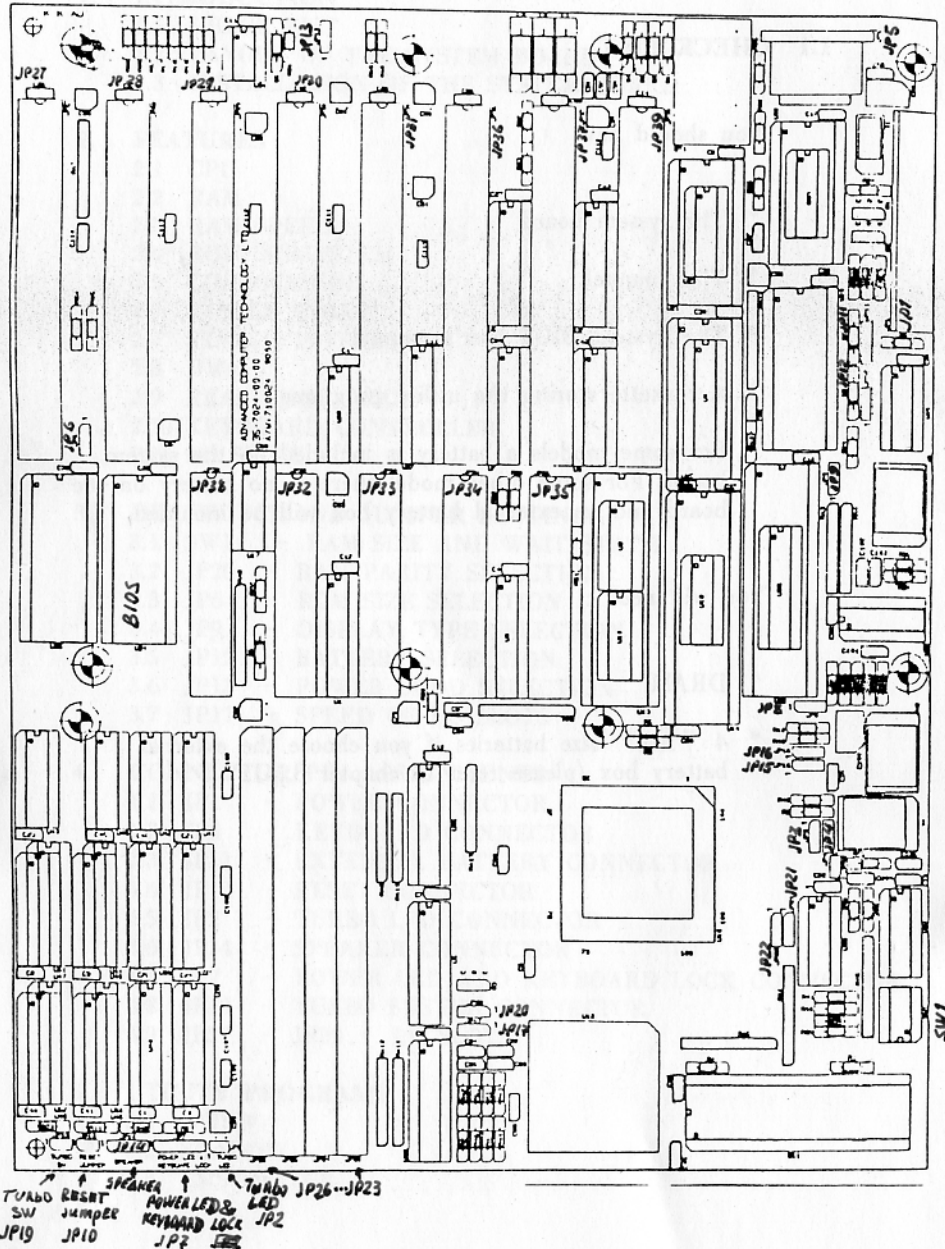
You should have :

- \* The system board
- \* This manual
- \* The System BIOS user's manual
- \* A diskette storing the utility programs
- \* For some models a battery is included on the system board. For some other model there is no battery on the board and an external battery box will be included.

You will need :

- \* DRAM
- \* 4 "AA" size batteries if you choose the external battery box (please refer to chapter 3,jp12)

## 1.2 LAYOUT OF THE SYSTEM BOARD



## 1.3 INSTALLATION OF THE SYSTEM BOARD

Please read chapter 2, 3 and 4 before performing any installation.

If you are to install the system board to the computer cabinet, please follow the procedure described below :

1. Add memory chips to the system.  
  
According to the size you installed, set the DIP switch SW1 properly.  
  
You can disable parity check by setting jumper jp20.
2. Install the system board into the cabinet.
3. Connect the power cable. Make sure the power supply is adjusted to the correct AC voltage (220/110).
4. Put four "AA" size batteries into the battery box and connect it to connector JP11 if you select the external battery box.
5. Connect the keyboard cable to the keyboard connector JP5. Make sure the keyboard is operating in "AT" mode by setting the appropriate switch.
6. Plug in the speaker connector and the power LED and keyboard lock connector.  
  
If your computer has reset button, turbo switch and turbo indicator, please also make the connection.
7. Plug in a display card and set the display jumper JP9 accordingly. Connect the monitor cable to the display card.
8. Double check all connection. Then turn the power on.
9. You should see the sign on message on the screen.

## 2 FEATURES

The HAT-12/8S is a system board based on the powerful 80286 CPU. All IBM AT software can be run on this system board. In addition, the system board has 8 I/O slots which can accept peripheral cards built for the IBM AT.

The HAT-16/8S and HAT-25/8S have the same features as the HAT-12/8S except that they are running at 16 Mhz and 25 Mhz respectively.

### 2.1 CPU

80286 is used as the CPU of the HAT-12/8S. The CPU can be operated at 12 Mhz or 8 Mhz. The speed is selected by using the turbo switch (JP19, please refer to chapter 4) or keyboard command. The CPU is operated at 16 Mhz or 8 Mhz for at 25 Mhz or 8 Mhz.

To toggle the speed between 12 Mhz and 8 Mhz for HAT-12/8S, (16 Mhz and 8 Mhz for HAT-16/8S, 25 Mhz and 8 Mhz for HAT-25/8S), press

CTRL ALT \*

simultaneously.

The system board supports dynamic clock switching. When accessing slower devices on the I/O slots, the CPU will be slowed down to 8 Mhz. This ensures that all IBM AT peripheral cards are supported even when the CPU is running much faster than the IBM AT.

The CPU have two modes : real address mode and protected mode. In real address mode the CPU can run all program written for the 8088 CPU. Most of the software for the IBM PC/XT can be run on the system board.

In protected mode the CPU support virtual address and multitasking. This feature is employed in some advanced software such as OS/2.

### 2.2 RAM

The system board supports the following RAM configuration :

512 K	: 44256 X 4 + (41256 X 2 parity) or 256K X 9 SIMM X 2
640 K	: 44256 X 4 + 4464 X 4 + (41256 X 2 parity) + (4164 X 2 parity) or 256K X 9 SIMM X 2 + 4464 X 4 + (4164 X 2 parity)
1 M	: 44256 X 8 + (41256 X 4 parity) or 256K X 9 SIMM X 4
2 M	: 1M X 9 SIMM X 2
4 M	: 1M X 9 SIMM X 4

41256 or 4164 are used as parity RAM. However, the RAM parity check function can be disabled (JP20, please refer to chapter 3).

The four-pole DIP switch SW1 is used to set the memory size.

SW1	SW1	SW1	RAM size	system RAM	extend RAM	RAM	Parity	SIMM	RAM
1	2	3				44256	41256	256K X9	1M X9
ON	ON	ON	512K	512K	OK	U37,U38 U39,U40	U41,U42		
							or	JP23 JP24	
ON	OFF	ON	1M	640K	384K	U37,U38 U39,U40 U44,U45 U47,U48	U41,U42 U43,U46		
							or	JP23 JP24 JP25 JP26	
OFF	ON	ON	2M	640K	1408K			JP23 JP24	
OFF	OFF	ON	4M	640K	3456K			JP23 JP24 JP25 JP26	

For 640 K configuration, set SW1 as follows :

SW1	SW1	SW1	RAM size	system RAM	extend RAM	RAM	location	Parity
1	2	3				44256	4464	41256 4164
ON	ON	OFF	512K	512K	OK	U37,U38 U39,U40		U41 U42
ON	OFF	OFF	640K	640K	OK	U37,U38 U39,U40	U49,U50 U51,U52	U41 U43 U42 U46
OFF	ON	OFF	Not Allowed					
OFF	ON	OFF	Not Allowed					

The extended RAM can also be used as expanded memory (EMS). Utility program will be supplied on diskette to support EMS.

Normal page mode and nibble mode DRAM can be used. most of the DRAM you can find is page mode DRAM.

Page mode DRAM :

Hitachi	HM51256	
	HM51256	
	HM50464	
	HM514256	
	HM511000	*
NEC	uPD41256	
	uPD41464	
	uPD421000	*
	uPD424256	
Texas Instruments	TMS4256	
	TMS44C256	
	TMS4C1024	*
Toshiba	TMM41256	
	TMM41464	
	TC511000	*
	TC514256	

### Nibble mode DRAM

Hitachi	HM50257	
	HM50465	
	HM511001	*
NEC	uPD41257	
	uPD421001	*
Texas Instruments	TMS4257	
	TMS44C257	
	TMS4C1025	*
Toshiba	TMM41257	
	TC511001	*

Those that are marked with '\*' are not supported by this system board.

Static column mode DRAM are not supported. So avoid using the following :

Hitachi	HM51258
	HM514258
	HM511002S
NEC	uPD421002
	uPD424258
Texas Instruments	TMS4C1027
Toshiba	TC511002
	TC514258

This list does not cover all the manufacturer in the market. If the user has any question, he should consult the corresponding data book for that DRAM.

Static column mode DRAM is rare and expensive. So we do not expect user to use them.

### 2.3 RAM SPEED

The number of wait state for RAM access can be selected by SW1-4. The CPU will run faster at 0 wait state. However, you need faster RAM.

---

SW1-4	Wait state	RAM speed required		
		HAT-12/8S	HAT-16/8S	* HAT-25/8S
ON	1	120 ns	100 ns	70 ns
OFF	0	100 ns	70 ns	

---

\* SW1-4 must be set to ON for HAT-25/8S. And most good 80ns RAM also work for it.

### 2.4 ROM SUBSYSTEM

Two BIOS (Basic Input Output Services) ROM are included in the system board. The size of the BIOS is 64 K.

The system board supports shadow RAM feature. The contents of the BIOS can be copied to RAM. In this way the program can be executed much faster. Utilities program will be supplied on diskette to support shadow RAM.

### 2.5 COPROCESSOR

To speed up floating point calculation, a coprocessor 80287-8 can be added in the socket U11.

The coprocessor is operated at 8 Mhz.

When installing the 80287, please make sure the notch on the IC is pointing towards the left side of the system board.

## 2.6 SYSTEM TIMER

The system board has three programmable timer/counters.

Channel 0 is used as the system timer, which is connected to the interrupt controller IRQ0. There are about 18.2 ticks per second.

Channel 1 is programmed as a 15 microsecond period refresh request signal.

Channel 2 is used as the tone generator for speaker.

## 2.7 SYSTEM INTERRUPTS

The 80286 CPU NMI and the interrupt controller provide 16 levels of system interrupts.

Any or all interrupts may be masked.

The following shows the interrupt-level assignment in decreasing priority.

Level	Function	
NMI	parity or I/O channel check	
Interrupt controllers		
CTRL1	CTRL2	
IRQ0	timer output 0	
IRQ1	keyboard buffer full	
IRQ2		
	IRQ8	real time clock
	IRQ9	software redirected to INT OAH
	IRQ10	reserved
	IRQ11	reserved
	IRQ12	reserved
	IRQ13	80287
	IRQ14	hard disk
	IRQ15	reserved
IRQ3	COM2	
IRQ4	COM1	
IRQ5	printer port 2	
IRQ6	FDC	
IRQ7	printer port 1	

## 2.8 DMA

The system board supports seven DMA channels.

Channels 0 to 3 supports 8 bit data transfers while channels 5 to 7 support 16 bit data transfers.

Channel 1 is for SDLC (Synchronous Data Link Control).  
Channel 2 is for floppy diskette controller.  
The other DMA channels are available at the I/O slots.

## 2.9 REAL TIME CLOCK

The system board includes a real time clock with battery backup. The IC used is a Motorola MC146818P, which contains the real-time clock and 64 bytes of CMOS RAM. The CMOS RAM stores system configuration parameters.

For some models there is a rechargeable battery on the system board. However, some models will not have that. In the latter case an external battery box is included which houses four "AA" size batteries. The battery box should be connected to connector JP11.

## 2.10 KEYBOARD CONTROLLER

The keyboard controller is a single-chip microcomputer 8042. It receives serial data from the keyboard, checks the parity of the data, translates scan codes, and presents the data to the system by interrupt. The status register contains error bits.

## 2.11 I/O SLOTS

On the system board there are five 16 bit I/O slots and three 8 bit slots. They are used for expansion purposes.

For compatibility with IBM AT peripheral cards, the I/O slots are running at 8 Mhz. Therefore there should be no compatibility problems.

## 3. DIP SWITCH AND JUMPER SETTINGS

### 3.1 SW1 - RAM SIZE WAIT STATE

SW1-1, SW1-2, SW1-3, are used to set the memory size.

---

SW1-1	SW1-2	SW1-3	RAM size
ON	ON	ON	512 K
ON	OFF	ON	1 M
OFF	ON	ON	2 M
OFF	OFF	ON	4 M
ON	ON	OFF	512 K
ON	OFF	OFF	640 K
OFF	ON	OFF	Not Allowed
OFF	OFF	OFF	Not Allowed

---

SW1-4 is used to set number of RAM wait states.

---

#### SW1-4

ON	1 wait state
OFF	0 wait state

---

Note : SW1-4 must be set to on for HAT-25/8S.



### 3.2 JP20 - RAM PARITY SELECTION

Parity RAM are used to ensure that the memory contents are valid. However, the user may choose to reduce the cost by disabling parity check.

---

JP20

2-3 Parity check disabled  
1-2 Parity check enabled

---

### 3.3 JP6 - ROM SIZE SELECTION

The system board supports both 32 K BIOS and 64 K BIOS

---

JP6

1-2 32 K BIOS (27128 X 2)  
2-3 64 K BIOS (27256 X 2)

---

### 3.4 JP9 - DISPLAY TYPE SELECTION

---

JP9

1-2 Monochrome display adapter  
, Hercules Graphics Card,  
EGA or VGA  
  
2-3 Color Graphics Card

---

### 3.5 JP12 - BATTERY SELECTION

---

JP12

1-2 External battery for real time clock  
2-3 Internal battery for real time clock

---

### 3.6 JP13 - POWER GOOD SELECTION

---

JP13

2-3 Internal power good generator  
1-2 power good signal from power supply

---

### 3.7 JP17 - SPEED OF I/O SLOTS

---

JP17

1-2 I/O Slots running at 8 Mhz  
2-3 I/O Slots running at 6 Mhz

---

JP 16

1-2 12 MHz  
2-3 16 MHz

## 4 CONNECTOR PIN ASSIGNMENTS

### 4.1 JP1 - POWER CONNECTOR

---

Pin	Function
1	Power good
2	not used
3	+12 volt
4	-12 volt
5	GND
6	GND
7	GND
8	GND
9	-5 volt
10	+5 volt
11	+5 volt
12	+5 volt

---

### 4.2 JP5 - KEYBOARD CONNECTOR

---

Pin	Function
1	Keyboard clock
2	Keyboard data
3	not used
4	GND
5	5 volt

---

### 4.3 JP11 - EXTERNAL BATTERY CONNECTOR

---

Pin	Function
1	6 volt
2	not used
3	GND
4	GND

---

### 4.4 JP10 - RESET CONNECTOR

---

1-2	
short	reset the system
open	normal

---

### 4.5 JP2 - TURBO LED CONNECTOR

---

Pin	Function
1	LED anode
2	LED cathode

---

#### 4.6 JP14 - SPEAKER CONNECTOR

---

##### Pin Function

- 1 Speaker +
  - 2 not used
  - 3 GND
  - 4 Speaker -
- 

#### 4.7 JP7 - POWER LED AND KEYBOARD LOCK CONNECTOR

---

##### Pin Function

- 1 LED anode
  - 2 not used
  - 3 GND
  - 4 Keyboard lock
  - 5 GND
- 

#### 4.8 JP19 - TURBO SWITCH CONNECTOR

For the HAT-12/8S system board,

---

1-2

Short 8 Mhz  
Open 12 Mhz

---

For the HAT-16/8S system board,

---

1-2

Short 8 Mhz  
Open 16 Mhz

---

For the HAT-25/8S system board,

---

1-2

Short 8 Mhz  
Open 25 Mhz

---

Note : The Speed of the CPU can also be toggled by keyboard command.

#### 4.9 JP27-JP39 - I/O SLOTS

Pin	Function	Pin	Function
A1	I/O channel check	B1	GND
A2	SD7	B2	RESET
A3	SD6	B3	+5 VOLT
A4	SD5	B4	IRQ9
A5	SD4	B5	-5 VOLT
A6	SD3	B6	DREQ2
A7	SD2	B7	-12 VOLT
A8	SD1	B8	OWS
A9	SD0	B9	+12 VOLT
A10	I/O channel ready	B10	GND
A11	AEN	B11	SMEMW
A12	SA19	B12	SMEMR
A13	SA18	B13	IOW
A14	SA17	B14	IOR
A15	SA16	B15	DACK3
A16	SA15	B16	DREQ3
A17	SA14	B17	DACK1
A18	SA13	B18	DREQ1
A19	SA12	B19	REFRESH
A20	SA11	B20	CLK
A21	SA10	B21	IRQ7
A22	SA9	B22	IRQ6
A23	SA8	B23	IRQ5
A24	SA7	B24	IRQ4
A25	SA6	B25	IRQ3
A26	SA5	B26	DACK2
A27	SA4	B27	TC
A28	SA3	B28	ALE
A29	SA2	B29	+5 VOLT
A30	SA1	B30	OSC
A31	SA0	B31	GND

Pin	Function	Pin	Function
C1	SBHE	D1	MEMCS16
C2	LA23	D2	IOCS16
C3	LA22	D3	IRQ10
C4	LA21	D4	IRQ11
C5	LA20	D5	IRQ12
C6	LA19	D6	IRQ13
C7	LA18	D7	IRQ14
C8	SA17	D8	DACK0
C9	MEMR	D9	DREQ0
C10	MEMW	D10	DACK5
C11	SD8	D11	DREQ5
C12	SD9	D12	DACK6
C13	SD10	D13	DREQ6
C14	SD11	D14	DACK7
C15	SD12	D15	DREQ7
C16	SD13	D16	+5 VOLT
C17	SD14	D17	MASTER
C18	SD15	D18	GND

## 5 UTILITY PROGRAMS

The following utility programs are included in the diskette shipped :

### 5.1 SATSW

SATSW is a utility program which serves the following purposes :

- \* change the CPU speed.
- \* change the number of wait states during RAM access.
- \* alter the number of wait states for BIOS ROM access.
- \* alter the operating speed of the I/O slots.

To see what this program can do for you, just type

```
A>SATSW <ENTER>
```

### 5.2 SHADOW

This program is used to enable shadow RAM function.

### 5.3 EMS DRIVER

The system board supports LIM EMS 4.0. A driver program EMMSAT SYS is included for this purpose.

There is a file "READ.ME" on the diskette containing detail information about these utility programs. Please read the file by typing the following at the DOS prompt :

```
A>TYPE READ.ME <ENTER>
```