Honeywell

RELEASE 300 KEYBOARD'S MAINTENANCE

REL300KB-M
4-26-79

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RELEASE 300 KEYBOARDS

1. INTRODUCTION

Testing, adjustment, troubleshooting, and repair information for the Release 300 Keyboard family are provided in this publication. This product family is a principal portion of Honeywell's process operator and process engineer interfaces to process managment systems such as the SUPERVISORY System and the TOTAL System. The keyboards and associated HPV-2 color video displays create interactive links between people and the process managment system.

The Release 300 Keyboard products are:

- Model AOSK101 Operator's Keyboard, SUPERVISORY System.
- Model AOSK102 Operator's Keyboard, TOTAL System.
- Model AOEK101 Engineer's Keyboard.
- Model AOLP101 Light Pen.

These products may be used on systems other than SUPERVISORY and TOTAL Systems. The Light Pen is not used on SUPERVISORY nor TOTAL Systems.

2. PRECAUTIONS

The keyboard electronics assembly has 115 Vac at several points, and care in handling it is appropriate. Specifically, power supply PS1, terminal board, TB1, fuse, F1, and switch, SW1, all have terminals to which the primary ac power is connected. All of these terminals are covered by plastic shields, which should be removed only by competent technical people. The shields must be replaced before the assembly is left for normal operation.

The various connectors on the keyboards, light pen, and the interface printed wire assembly (PWA) in the electronics assembly should not be removed or reinserted while power is on, because there is a chance that damage to the electronics components may occur. SW1 on the electronics assembly should be OFF when connectors are inserted or removed.

3. OPTIONS

3.1 Serial Printer Interface/Keyboard Electronics Address

Each Release 300 Keyboard Subsystem requires a Serial Printer Interface through which the processor transmits commands to the keyboard electronics assembly. A single Serial Printer Interface board (PX4000PTTA1) may be connected to one, two, three, or four keyboard electronics assemblies, (located in a rack, below the keyboards) using interconnecting cables, 4DP3AAOC209, between the SPI and the first electronic assembly, and between electronic assemblies 2, 3, and 4. These cable connections are made as shown in Fig. 3.1.

If only one Keyboard Subsystem is connected to the SPI, a 4DP3AAOC109 cable assembly is connected as shown at the bottom of Fig. 3.1.

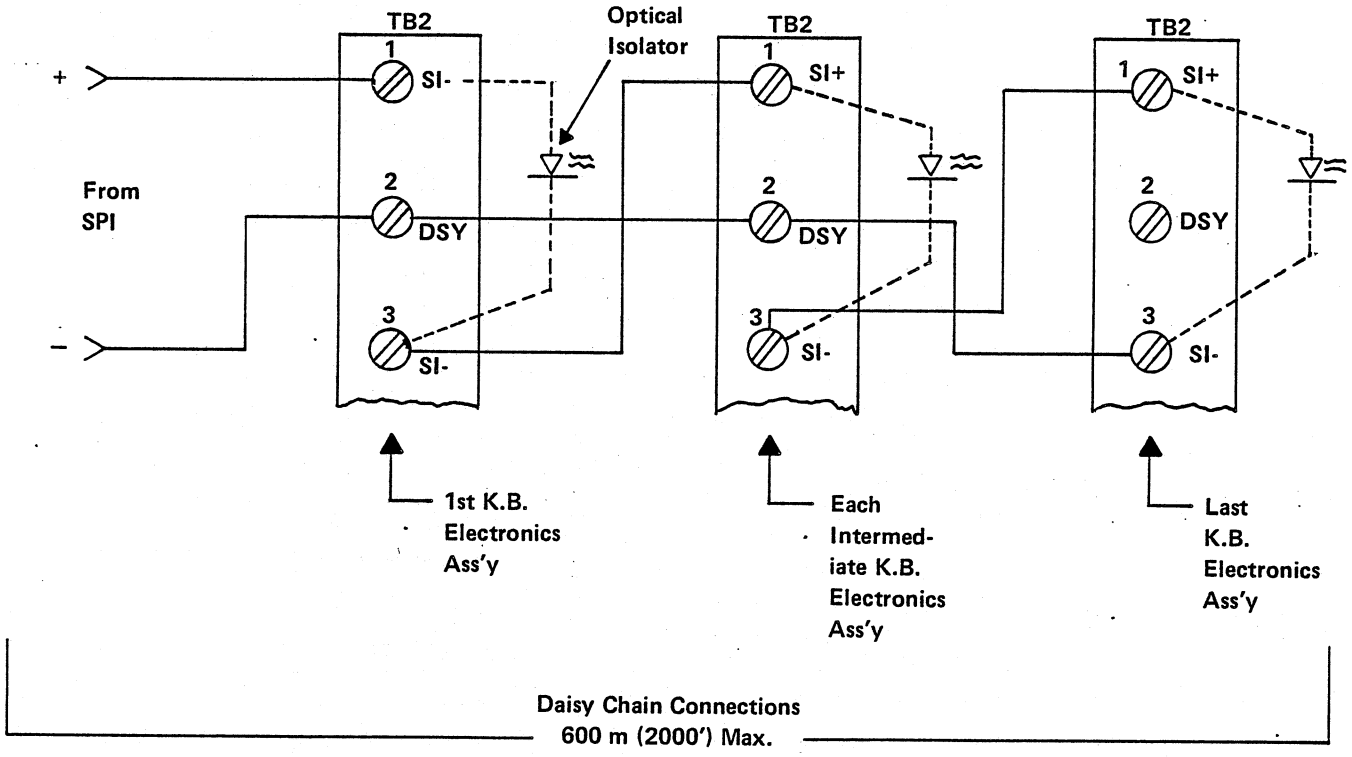
Each keyboard electronics assembly in a daisy chain must have a unique address. Address selection is accomplished by jumper connections, S1 and S2, located near connector J5 on the large interface PWA, on the assembly. S1 and S2 are connected between the middle socket and the "0" and "1" sockets as follows:

	S1	S2
1st K. B. Electronics Ass'y	0	0
2nd K. B. Electronics Ass'y	0	1
3rd K. B. Electronics Ass'y	1	0
4th K. B. Electronics Ass'y	1	1

The keyboards are not addressed by the codes from the SPI, in the usual sense. These jumpers make them respond to unique sets of command codes, as described under the "Operation" heading in theory publication REL300KB-T.

3.2 Timer and Alarm Cables

Each Release 300 Keyboard Subsystem requires a Timer and Alarm Package in the processor through which the processor and Keyboard Subsystem may request initialization of each other. As with the SPI, up to four keyboard electronics assemblies may be connected to a single TAP. When only one electronics assembly is connected to the TAP, cable 4DP3AAZAC109 is used. Where 2, 3, or 4 keyboard electronics assemblies are connected to the TAP, cable 4DP3AAZAC209 is used between the TAP and the first electronics assembly, and between each subsequent keyboard electronics assembly. These connections are parallel: The TAP contact inputs to each keyboard electronics assembly connect to TB2, pins 4 and 5. The keyboard assembly contact outputs to the TAP are TB2, pins 6 and 7.



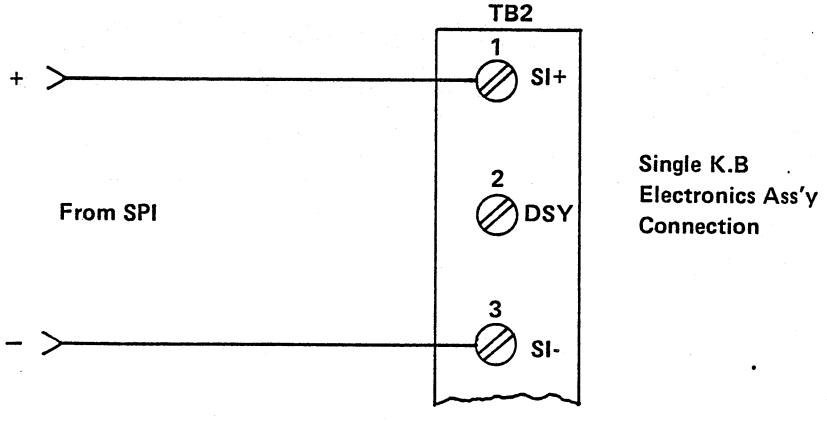


Fig. 3.1 Serial Printer Interface to Keyboard Electronics

3.3 Engineer's Keyboard Option

The optional Engineer's Keyboard is intended for use by a process engineer in building the plant and process specific information into the process management system. While the Operator's Keyboard has keys arranged for a simple "look and push" operation, the Engineer's Keyboard features alphanumeric keys in a typewriter layout. Several function keys are provided to simplify the creation of custom displays for the process operator.

Each SUPERVISORY and TOTAL Operator Station may accomodate an Engineer's Keyboard in a drawer assembly, just below the Operator's Keyboard. Thus, the Engineer's Keyboard is out of the way, except when it is drawn out for use. It may be moved to a different Operator's Station, if care is taken in its handling, and if the precautions in part 2, above, are observed.

3.4 Light Pen Option

The optional light pen facilitates quick movement of the character entry cursor on the HPV-2 display sceen to a spot touched by the pen tip. It has a button on its side that requests transmission of the cursor's coordinates from the Display Generator to the processor. The SUPERVISORY and TOTAL Systems do not support use of the light pen.

When the light pen is present, a 5101970-100 light pen electronics PWA is installed adjacent to the 51301896-100 interface PWA in the keyboard electronics assembly, using stand-off posts on the interface PWA. The light pen cable connects to the light pen electronics PWA and the blue video cable from the Display Generator is routed through the light pen electronics, rather than directly to the display monitor.

3.5 Test/Run Jumper

This jumper is located adjacent to J5 on the 51301896-100 interface PWA. It is used in the factory to allow testing with a special test fixture. In the field, the jumper should always be connected between the center socket and the RUN socket.

3.6 Serial Printer Interface and Timer and Alarm Package

Refer to part three in publication AMPA/B-M (SPI) and ATAP11-M (TAP) for instructions for setting up address and option jumpers on the PTTA1 and AXTS11 boards. The SPI must be set to operate at 1200 baud. The TAP jumpers must be set up as follows:

Install SP3 Stall Alarm.
Install SP4 Programmable Alarm.
Install SP5 Power Failure Alarm.
Install SP9 As shown. Enable Remote Initialization.

Both the SPI and TAP board's addresses and priorities must be set as specified for the system. For SUPERVISORY and TOTAL Systems the addresses are (later) and (later) respectively. For other systems, refer to the System Book (System Spec. Section 5), which is under the System Drawings tab in the System Drawings binder, a member of the customer documentation book set.

4. REFERENCES

Publication Number	Title
PTH-025	SUPERVISORY/TOTAL Operator's Manual
APVB-J-T	HPV-2 Video Display Subsystem Theory
APVB-J-M	HPV-2 Video Display Subsystem Maintenance
REL300KB-T	Release 300 Keyboards Theory
ATAP11-T	Timer and Alarm Package Theory
ATAP11-M	Timer and Alarm Package Maintenance
AMPA/B-T	Matrix Printer Subsystem Theory (includes Serial Printer Interface Theory)
AMPA/B-M	Matrix Printer Subsystem Maintenance (includes Serial Printer Interface)
AR94-V-O&M	HPV-2 Display Generator Operation & Maintenance Manual
51103046	Release 300 Keyboard Test Program

5. COMPONENT LOCATIONS

Figure 5.1 shows the typical locations of the principal components of the Release 300 Keyboard Subsystem. The Operator's Keyboard is mounted in a modular furniture table top. The optional Engineer's Keyboard is installed in a rack and drawer assembly attached to the overhang portion of the table top. The keyboard electronics assembly is installed in a 19" (48 cm) rack, inside the front door of the furniture assembly. The interface PWA and light pen electronics PWA (if present) are on the outside of the assembly. The power switch and fuseholder are also on the outside.

The interconnecting cables, except for those from external members of the subsystem, are shown on Fig. 5.2. Cables to the Display Generator, the Serial Printer Interface, and the Timer and Alarm Package are connected as shown on Fig. 5.3. Fig. 5.3 also shows the interconnections when the light pen option is present. When it is, the blue video output from the Display Generator is routed through the light pen electronics on its way to the Display Monitor.

6. TEST EQUIPMENT AND MATERIALS

No special test equipment nor materials are required. Normal test items such as a multimeter and oscilloscope are used.

7. PREVENTIVE MAINTENANCE

No formal preventive maintenance schedule is required for this keyboard subsystem. A check of the dc power supply output at yearly intervals is a good idea. See part 10 below for the power supply adjustment procedure.

8. PERFORMANCE TESTS

The best performance test of this subsystem is the regular daily operation of the subsystem as described in the "Operation" section of theory publication, REL300KB-T, and as described in the SUPERVISORY/TOTAL Operator's Manual, PTH-025. The service policy for SUPERVISORY and TOTAL Systems is that the system be left operating, on-line during test and troubleshooting procedures, so far as possible.

When it is necessary to perform a rigorous test procedure to verify proper operation of the hardware, the system must be taken off line to run test programs 51103046. Instructions for this program are on drawing 51103046 and the program is available on loadable cards or on the floppy diskette test program package. This program is an ATPG program. For help in running and interpreting the results of such programs refer to publication ATPG-I.

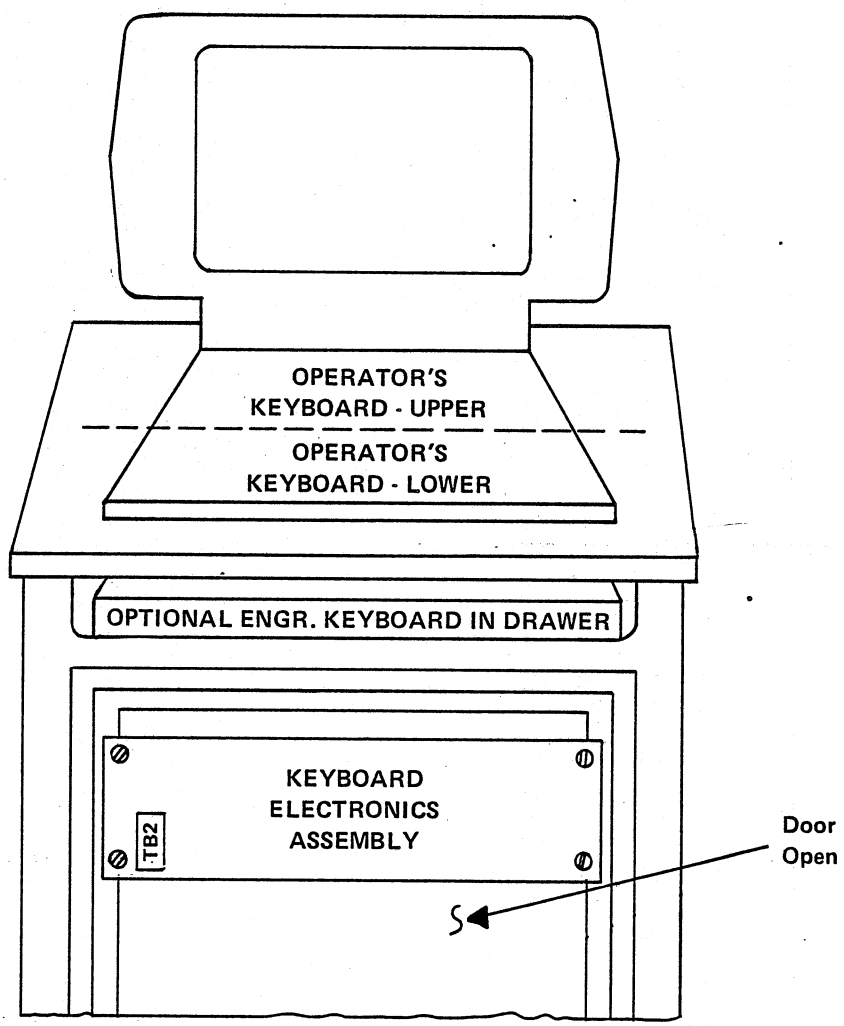


Fig. 5.1 Component Locations

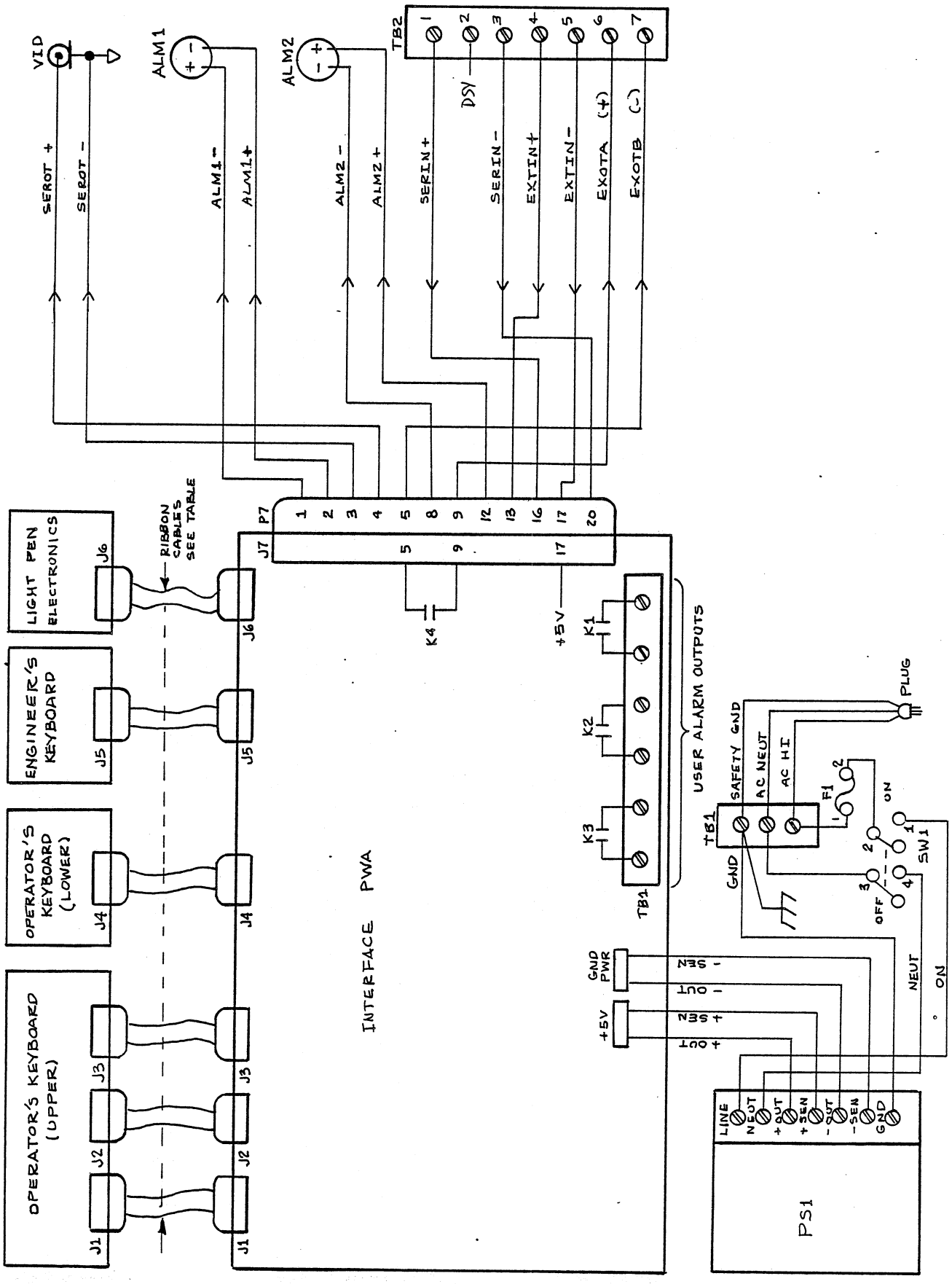


Fig. 5.2 Simplified Schematic, Keyboard Subsystem

9. ASSEMBLY/DISASSEMBLY

No special assembly or disassembly procedures are required. All of the keyboard subsystem components are fastened with conventional hardware. Fig. 5.1 shows the location of the principal components. Figures 5.2 and 5.3 show how the cables are interconnected. Be sure to observe the precautions under part 2, above when assembling or disassembling parts of this subsystem.

9.1 Operator's Keyboard Lamps

Access to the lamps is through the snap-off key caps. To remove, pull the lamp straight out. To replace, insert the lamp so that its two wires make contact with the contacts in the socket.

10. ADJUSTMENTS

The only adjustment in this keyboard subsystem is the output of Power Supply, PS1, on the keyboard electronics assembly. The adjustment is accomplished with a small screwdriver and is reached through a hole in the power supply module cover, next to its input/output terminal board. Connect an accurate voltmeter between the +5V and GND PWER lugs on the 51301896-100 interface PWA and verify that the dc voltage is between 4.75V and 5.25V. If not, turn the adjustment until the voltage is as near 5.00 volts as you can get it.

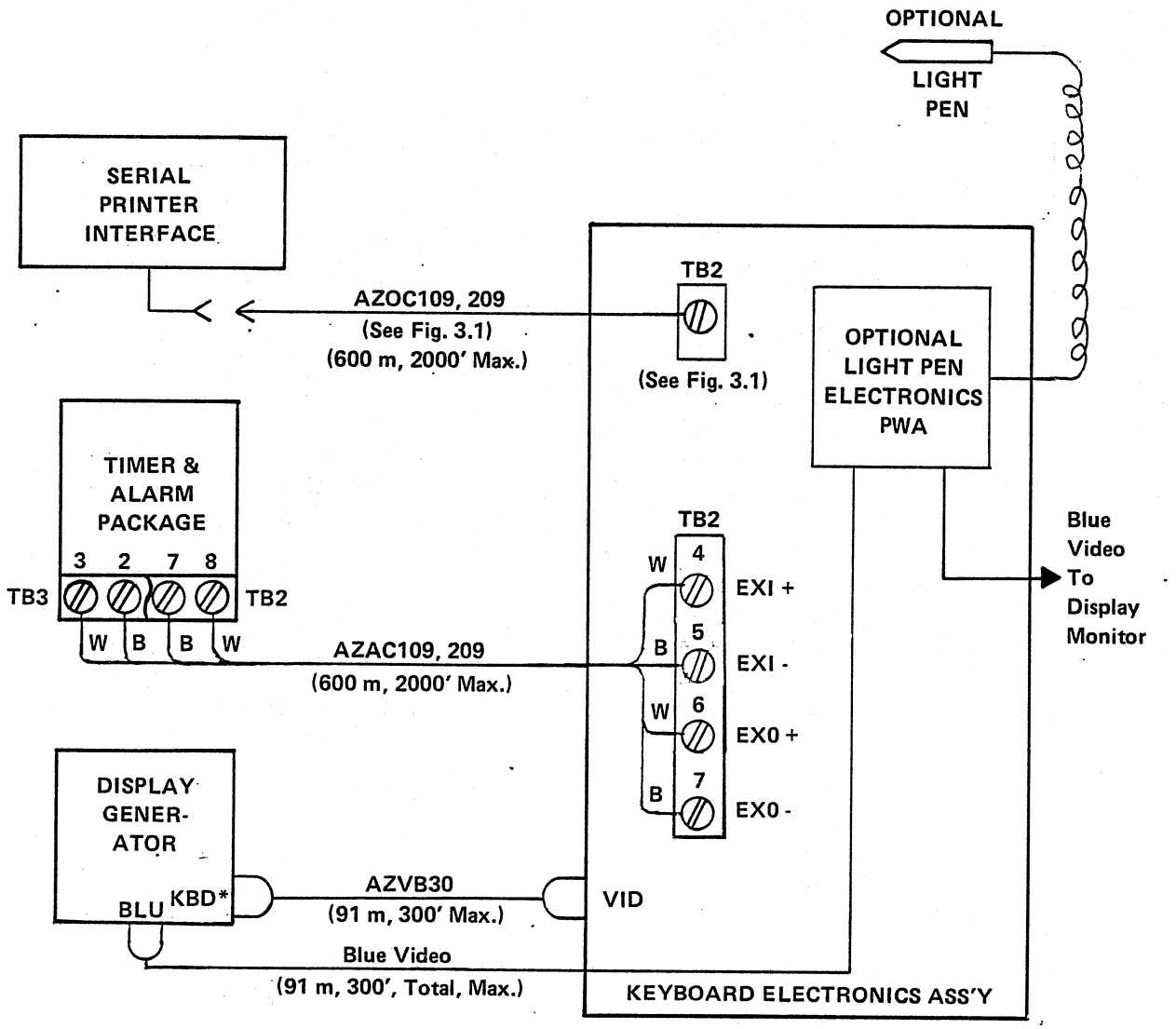


Fig. 5.3 External Cables

*Keyboard Buffer Unit (one of up to 4 channels)

11. TROUBLESHOOTING

Although this Keyboard Subsystem is marketed and documented as an independent subsystem, functionally, it is a member of a larger subsystem, the HPV-2 Video Display Subsystem. The troubleshooting procedures provided here assume that the user has good reason to suspect that the problem he or she is working on is in the keyboard subsystem. They also are designed to direct the troubleshooter elsewhere, as soon as it becomes apparent that the trouble is not in the Keyboard Subsystem. Further, these procedures can be used while the process management system is on-line. Usually, troubles can be isolated to a replaceable board or module without taking the system off line to run the keyboard test program.

To determine that a trouble probably is in the Keyboard Subsystem hardware, it may be necessary to observe the operation of the interfaces within the subsystem and between the Keyboard Subsystem and the remainder of the process management system. These interfaces are described in theory publication REL300KB-T, and this publication should be available when using these procedures.

Four troubleshooting flow charts are provided here to guide the troubleshooter to the remedy. These are based on four basic trouble descriptions:

- All Keyboard Functions are Dead, nothing works; Fig. 11.1.
- Lamps not Working, one, more than one, or all the lamps don't light: Fig. 11.2.
- No Response or Wrong Response to Keystrokes; Fig. 11.3
- Optional Light Pen not Working; Fig. 11.4.

When a flow chart path reaches a point where another subsystem should be considered, or where there may be several possible remedies, the user is directed to one of the following sub-parts to this part 11.

11.1 Nothing Works

11.1.1 Microprocessor is Sequencing; Cables are O.K.

If none of the keyboard functions work, pushing keys does nothing, none of the lamps comes on, the alarms don't sound, yet the microprocessor is sequencing, the Keyboard Subsystem apparently, cannot communicate with any other part of the video subsystem. Check the following:

1. Is there a blinking cursor on the video screen, indicating that Display Generator and monitor power is on and that the keyboard electronics is connected? If so, go to step 2. If not, the trouble is most likely in the D. G. or the Display Monitor.

2. Connect a 'scope to the center conductor of the VID connector on the keyboard electronics assembly. Push one or more of the alphanumeric keys repeatedly. A waveform like that shown on Fig. 9 in theory publication REL300KB-T should be observed. If the waveform appears as a key is pushed, go to step 3. If there is no waveform, go to step 4. If the waveform has less than 2V peak amplitude go to step 5.

3. Apparently correct waveform is present. If the keyboard electronics is producing the correct serial bit pattern, the D. G. must be at fault.* Either you must examine each bit per the descriptions in the theory publication, or you may switch the D. G. input cable from the keyboard electronics to another keyboard electronics assembly known to be working and see if it exhibits the same problem. If you determine that the bit pattern is correct, proceed to troubleshoot the D. G. If you determine that the bit pattern is incorrect, replace the interface PWA.

4. If there is no waveform as a key is pushed, the trouble can be in the keyboard, in the interface PWA, or the cable or D. G. could be shorting the output. Probably, the only way that all keys on a keyboard would not function, would be in the absence of +5V to each of the keyboards, this is very unlikely, unless the cables are not connected correctly. Re-check the cables. If they are O.K., it is probably worthwhile to change the interface PWA. If both an Operator's Keyboard and an Engineer's Keyboard are present, and you have considered only one of these, see if the other keyboard works. If it works correctly, consider replacing the non-functioning keyboard.

5. If the waveform amplitude is low, temporarily disconnect the cable from the VID connector. If the amplitude goes to about 5V peak, the cable or the D. G. is loading the output excessively. Check out the cable first by disconnecting the end at the D. G. Reconnect the VID end. If it is the cable, the amplitude will drop.

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* The Keyboard Buffer Unit at the back of the D. G. may also be the source of such a problem. To check this, temporarily disconnect it from the input connector on the D. G. chassis and connect the keyboard cable to that connector (J5, J11, J17, or J23).

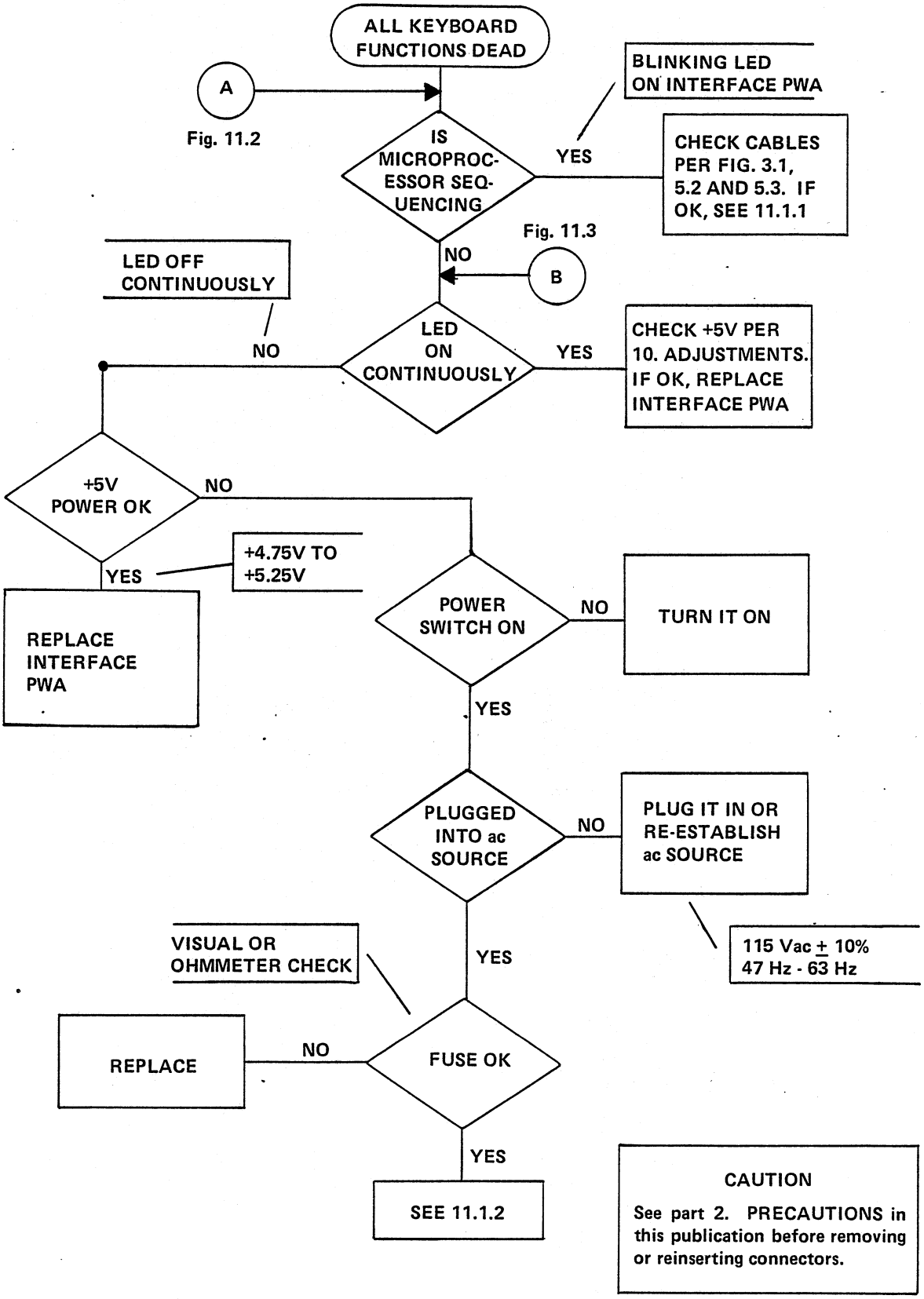

Fig. 11.1 Inoperative Keyboard Subsystem

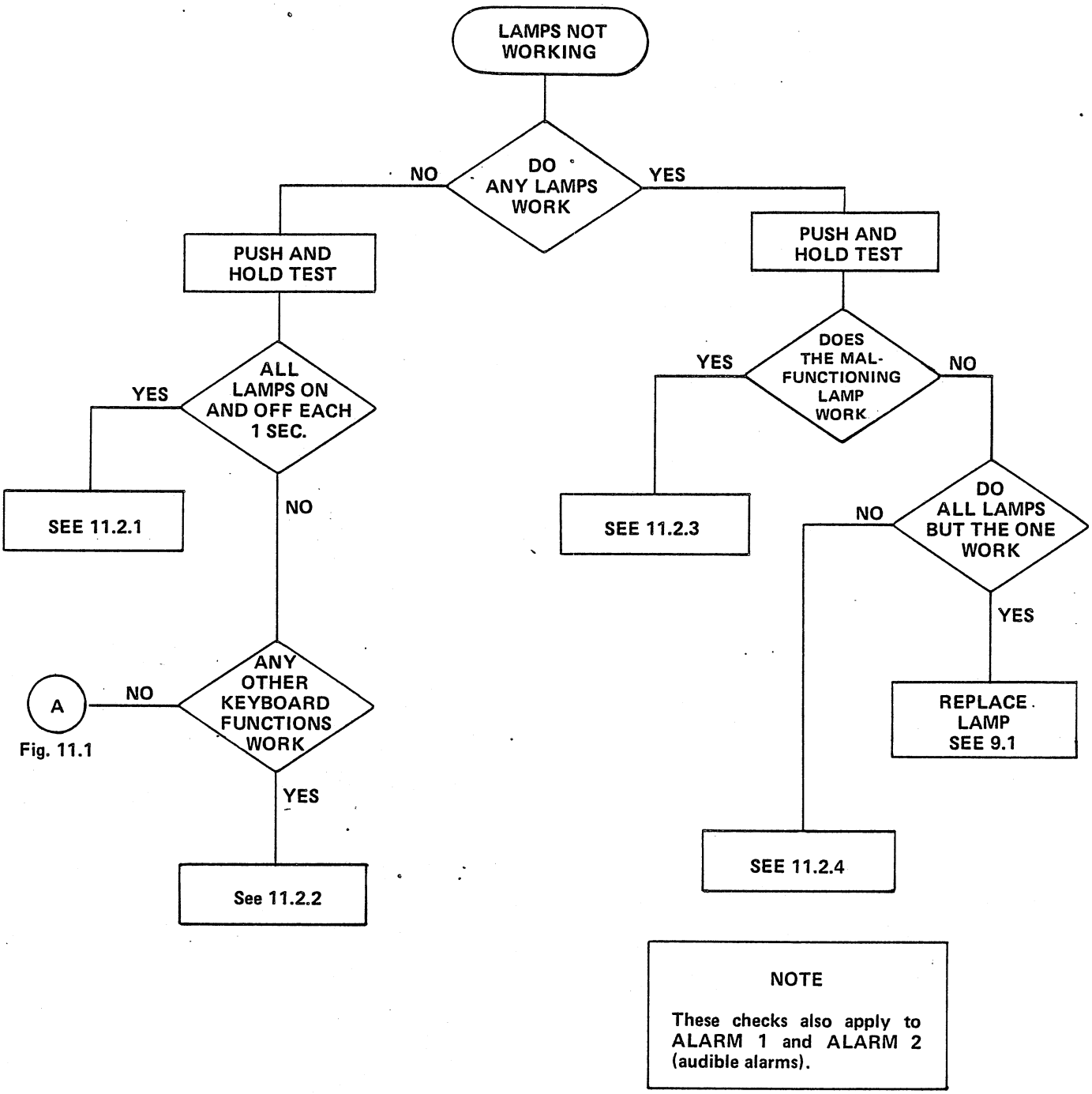

Fig. 11.2 Inoperative Lamps

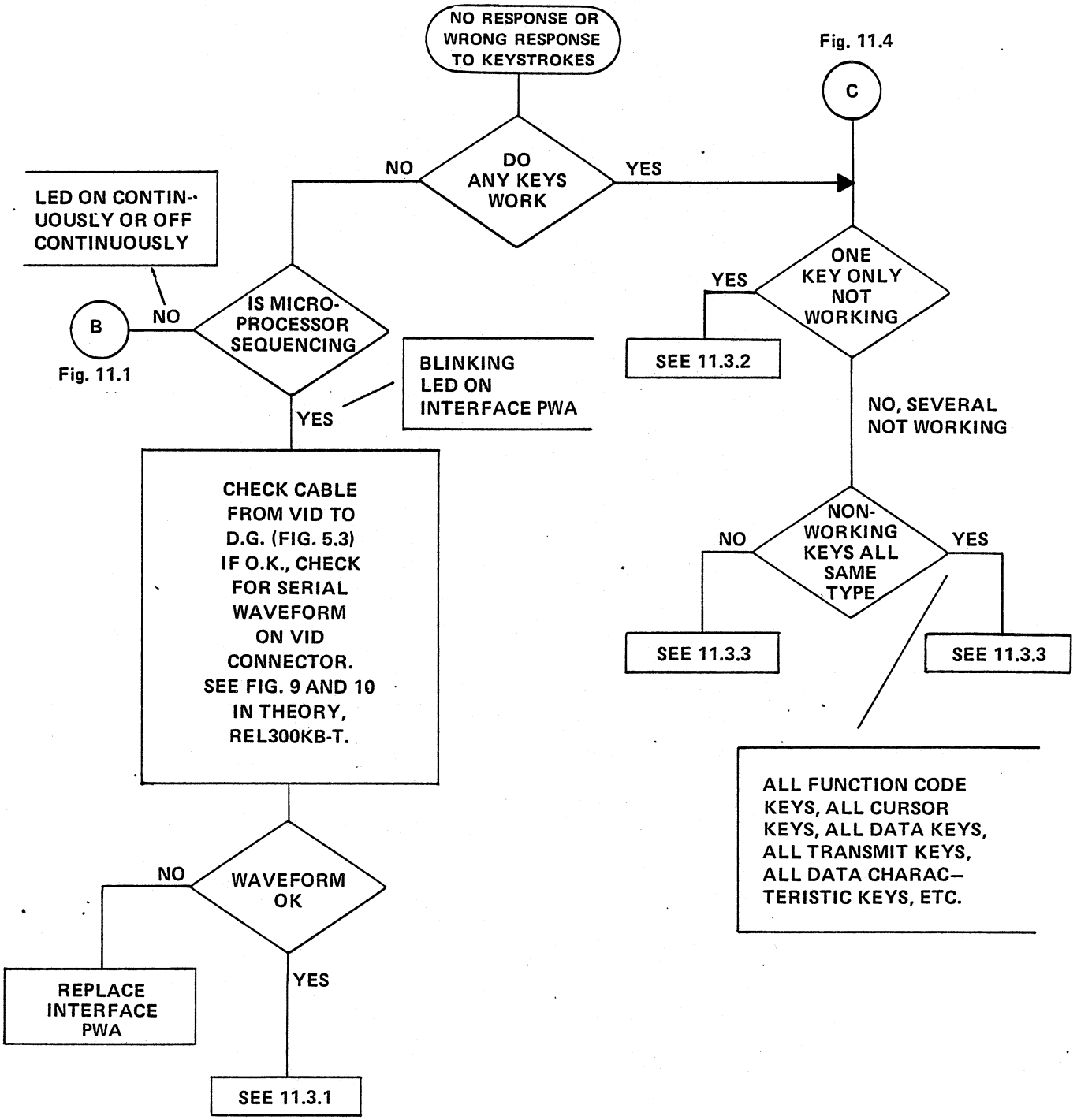

Fig. 11.3 Inoperative Key Functions

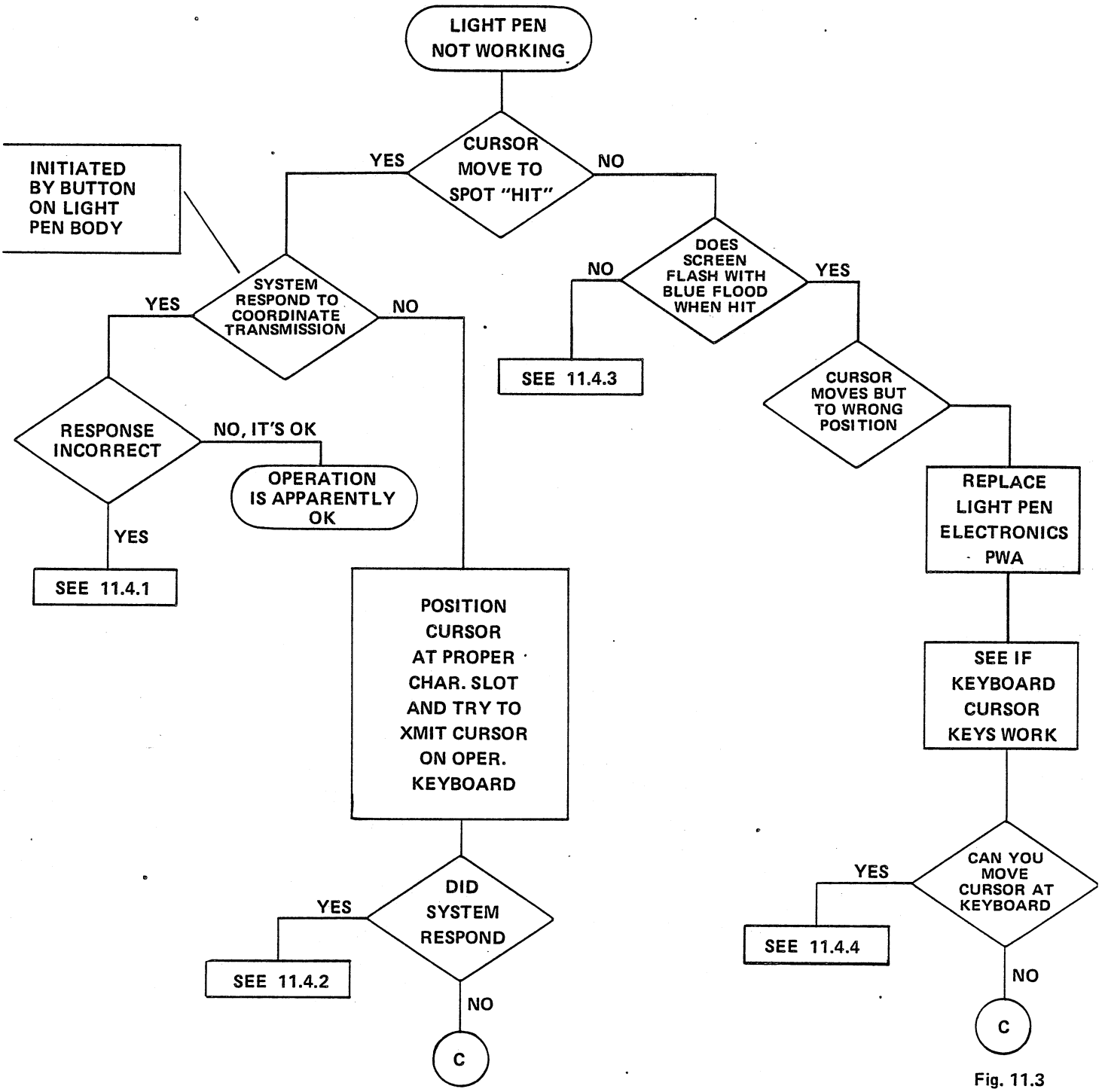

Fig. 11.4 Improper Light Pen Operation

11.1.2 +5V dc is Missing or Out of Tolerance

If the +5V output from the power supply module is 0V or too low, the electronics could be overloading it, and the automatic foldback circuit in the module could be lowering the output voltage to limit the current output. To check this, temporarily remove the +5V lug from the interface PWA. If +5V returns to normal, and drops when re-connected to the PWA, replace the interface PWA.

It is also possible that the power supply's internal crowbar has "fired" due to a voltage transient. If with the load removed, the output is still too low, turn SW1 off for a few seconds, and then back on. If the output returns to normal, the crowbar has recovered and you may reconnect the output to the PWA. Normal operation should resume.

In no case, should the output be more than +7V, because the crowbar should fire between +6.5V and +7.0V.

If the output is out of tolerance, try readjusting it per 10. ADJUSTMENTS. If it cannot be readjusted replace power supply module, PS1.

11.2 Lamps

11.2.1 Lamps Don't Operate, but Lamp TEST O.K.

If no lamps are operating, but the lamp test shows them all to be O.K., it must be that the operating software is not communicating with the keyboard.

The operating software should transmit something over the Serial Printer Interface to the keyboard electronics from time to time. The design of the Keyboard Subsystem permits a periodic test of the ability of the Keyboard Subsystem and the processor to communicate with each other on a regular basis. This self test scheme is described under the "Keyboard Identification and Self-Testing Features" heading in theory publication REL300KB-T.

If you have reached this point, the lamps are all out either because the software didn't try to turn any of them on, or because the keyboard electronics is not recognizing "lamp on" commands. If other keyboards are connected to the same SPI in a daisy-chain (Fig. 3.1), observe other Operator Keyboards to see if they are responding to lamp codes. If there are no other keyboards connected to the same SPI, or if none of them are responding to lamp codes from the processor, go to step 1. If one keyboard is not responding to lamp codes but others are, go to step 2.

1. There may be no transmissions coming from the SPI. Connect a 'scope to TB1, pin 1. Transmissions from the SPI will appear as a waveform of about 0.3V to 1.0V peak, with a form and timing as shown on Fig. 8 in theory publication REL300KB-T. Since this is a current loop, the voltage waveform is principally the voltage drop across the LED(s) in the optical isolator(s) on the interface PWA(s), so the amplitude will vary from unit to unit. If the signal is present, even though at irregular intervals, go to step 3. If no signal is seen, push one or more function code keys, such as DISP BACK or DISP FWD and watch the 'scope for the processor's acknowledgment. If there is none, the Serial Printer Interface may not be working, or there is some reason why the operating software is not responding. If you know the software should be running and responding, try replacing the Serial Interface PWA (PX4000PTTA1) that serves the Keyboard Subsystem(s). (This will probably require taking the system off-line, because power must be removed from the cabinet containing the GENIE Bus chassis with the SPI board.)

2. If other keyboards are responding to lamp codes, but one isn't, recheck cables and connections. If operation is not restored, replace the interface PWA.

3. If the software and processor are responding, and an apparently correct waveform is present on the input from the SPI, the interface PWA should be decoding the codes from the SPI and activating lamps as directed. Each of the lamp codes and the proper code sequences is defined in the Operation section of the theory publication. It is almost impossible to examine the bit patterns in these serial waveforms, so at this point, the choices are:

   a. Replace the SPI board (PX4000PTTA1) that serves the Keyboard Subsystem(s) (you will have to remove power from the cabinet with the GENIE Bus chassis containing this board.).

   b. Replace the interface PWA on the keyboard electronics assembly.

   c. Take the system off-line and run test program 51103046, using the lamp operation tests in the program to assure that the right codes are being sent to the keyboard. Then, use the test program results to help decide what to replace.

11.2.2 Lamps Don't Work but Other Keyboard Functions Do

This condition suggests that the interface PWA on the keyboard electronics assembly is not supplying lamp power to the Operator's Keyboard or that some malfunction is preventing all of the interface PWA's lamp drivers from work-

ing. This is not a very probable situation, so recheck your steps and check that all cables and connectors are installed properly (see Figs. 3.1, 5.2 and 5.3). If you arrive at this point again, try replacing the interface PWA, then the keyboard, or if other Keyboard Subsystems are present, try exchanging Operator's Keyboards, to see if the trouble follows a keyboard or remains with the keyboard electronics.

11.2.3 TEST Key Makes a Dead Lamp Work

This indicates that a lamp expected to light or blink on command by the operating software does not, but the lamp test confirms that the lamp and its driver are O.K. If other lamps are responding properly, but one or only a few are apparently not responding, the most likely location of the trouble is the interface PWA. However, it is also possible that the SPI is scrambling only a single code or only a few codes. Look for a pattern, in deciding what to replace. The lamp codes are all defined in the Operation section of the REL300KB-T theory publication. Don't overlook the possiblility that there is some system problem or confusion that makes you expect a lamp to be on or to blink, when it really shouldn't. You may want to take the system off line to run test program 51103046, which will transfer all combinations of lamp codes. Also, check other system functions that may be getting wrong data. The processor or GENIE Bus Controller could be causing the problem.

11.2.4 TEST Key Doesn't Make a Suspect Lamp Work, and Some Others Don't Work Either

This could mean that more than one bulb is burned out, so try replacing more than one. If it is not the bulbs, the possibilities are the upper or lower Operator's Keyboards or the interface PWA.

11.3 Inoperative Key Functions

11.3.1 Keystrokes Send Word to D. G. but D. G. Doesn't Respond

The trouble is either in the cable from the keyboard electronics to the D. G., in the interface PWA, or in the D. G.* If the D. G. has more than one Channel Set, or if another D. G. is available, move the coax. connector from the keyboard electronics to another channel input or another D. G. If the second D. G. or channel doesn't respond, the trouble is most likely in the cable or the interface PWA. Check the cable with an ohmmeter or try another cable. If O.K., replace the interface PWA. If the second channel or D. G. does not respond correctly, the original Channel Set or the original D. G. is at fault.

* This trouble could also be caused by the Keyboard Buffer in the back of the D. G. Try temporarily bypassing the buffer by reconnecting the coax cable from KBD on the buffer to the input connector on the D. G. chassis (J5, J11, J17, or J23).

11.3.2 Only One Key Isn't Working

While this trouble could be in the interface PWA in the keyboard electronics assembly; it isn't likely. It is more probable that the key, itself, is malfunctioning. You may try observing the key matrix outputs to the interface PWA while pushing the inoperative key (See Fig. 3 in the theory publication). If they are all not active, the key is probably defective. We don't recommend replacement in the field. The upper or lower Operator's Keyboard containing the bad key should be replaced, and returned to Honeywell for repair.

Still another possiblity is that the D. G. doesn't respond to one code, only. This is not highly probable, but it is worthwhile to connect the keyboard output to the D. G. to another D. G. or another Channel Set in the same D. G. to see if the trouble stays with the keyboard or clears up in the second Channel Set or the second D. G.

11.3.3 Several Keys Don't Work

If the keys that don't work are all the same type, chances are that the D. G. or its Channel Set is not responding to one of the four types of 19-bit serial words sent from the keyboard electronics: cursor coordinate words, function code words, control code words, and display character words. If possible, move the keyboard output to a different D. G. or a different Channel Set in the same D. G. If the second Channel Set or D. G. doesn't respond, the trouble is probably in the interface PWA in the keyboard electronics assembly. It could also be in the keyboard. If the second Channel Set or D. G. does respond correctly, the original Channel Set or D. G. probably has the trouble.

If two or three or more keys don't work, but they are different types of keys, the trouble may be in the keyboard. It is less likely that it is in the interface PWA. Such a trouble could also be in the D. G., so trying another Channel Set or another D. G. is worthwhile.

The Video Interface Controller on the processor's GENIE Bus may also cause this type of problem. When it is at fault other operator stations on the same D. G. and VIC will normally exhibit the same problem.

11.4 Light Pen Doesn't Work

11.4.1 System Responds to Coordinate Transmission but Response is Wrong

The cursor moved for some reason between the "hit" and to "transmit coordinates" command, or the wrong coordinates were passed on to the operating software. If the system has been in operation for some time with no problems,

this is probably a hardware malfunction, and it can be anywhere from the keyboard, through the D. G., to the Video Interface Controller to the processor. Trial with another D. G. or a second Channel Set in the same D. G. may indicate whether attention to the Keyboard Subsystem is in order or the D. G. or VIC needs attention. For newer Custom or special systems, this trouble can be in software or it can be a problem in interpretation of system functions.

11.4.2 Light Pen Won't Cause D. G. to Transmit Cursor Coordinates but the Keyboard Will

Could be the button contacts in the light pen. Also may be in the light pen electronics board. Some possibility that the trouble is in the interface PWA.

11.4.3 No Blue Flood when Screen is "Hit"

Check the blue video coaxial cables from the D. G. to the light pen electronics and from the electronics to the Display Monitor. If colors are wrong, there may be no blue video. This could be a problem in the light pen or in the light pen electronics. It is less likely that the trouble is in the interface PWA.

11.4.4 Light Pen Doesn't Move Cursor but Keyboard Does

This trouble is most likely in the light pen or its electronics board. There is some possiblity that the trouble is in the interface PWA.

11.5 Wrong Reset/Normalization Sequence

Since the RESET key is intended to initialize and restart the system, the system cannot be kept on-line while working on reset and normalization problems.

11.5.1 Contact Closure from Timer & Alarm Package Doesn't Start RESET Lamp Flashing

This feature can be checked at the keyboard electronics by momentarily jumpering TB2 pins 4 and 5. If this starts RESET flashing, any of the cables from the TAP, the TAP Board, AXTS11, or the TAP terminal panel, AXTB11, could contain the malfunction. If it doesn't cause RESET to flash, the lamp may be dead or the interface PWA may be malfunctioning. Push TEST and see if the lamp turns on and then off. If not, replace the bulb. If it does come on, the malfunction is most likely in the interface PWA.

11.5.2 Lamps and Audible Alarms Don't Go Off when RESET is Pushed

Either the RESET key, the keyboard assembly, or the interface PWA contains the malfunction. It might be well to look at the key matrix signals on J4/P4 from the lower keyboard to the interface PWA (see Fig. 3 in theory publication REL300KB-T) to see if the keystroke does produce and output on these lines. If it does, the interface PWA is most likely at fault. If none of the key matrix outputs go true when RESET is pushed, but they do when other keys are pushed, the RESET key may be inoperative. The lower keyboard assembly should then be replaced, as key replacement in the field is not recommended.

11.5.3 Software Doesn't Turn RESET Lamp Off in 1.5 Seconds

This should cause the keyboard electronics to close its contact output to the Timer and Alarm Package. This should be treated in the processor as a remote initialization signal, and the system should be initialized and restarted.

11.5.4 Software Doesn't Get Correct Keylock Status

The software must have reported some problem with keylock status. If so, there may be a problem similar to those checked out on Fig. 11.3. You may change the key switch position, if you have the keys, and observe the resultant waveform to the D. G. (coax. corrector VID, Fig. 5.2). If the interface PWA's microprocessor is running and a change in keylock status doesn't produce an output to the D. G., the key switch, the keyboard assembly, or the interface PWA may be at fault. It is not very likely that this symptom will be present without some other symptomatic information being available.

11.5.5 After a Normalization Sequence, the Keyboard Subsystem is not Normalized

The lamps should be out, alarms not sounding,the keyboard(s) should be ready for use. Of course, the operating software may turn on lamps or sound an alarm almost immediately, so the indication of improper normalization may be an unexpected response of some kind. There is a good chance that such a problem can be isolated through the use of the flow chart on Fig. 11.2 or Fig. 11.3.

12. PARTS

The following are the replaceable parts in the Release 300 Keyboard Subsystem.

12.1 Operator's Keyboard

- Upper Keyboard - 51400317-100
- Lower Keyboard - 51400316-100
- Lamps - Upper Operator's Keyboard, Chicago Miniature CM7-7714; Lower Operator's Keyboard, Chicago Minature CM7-7715.

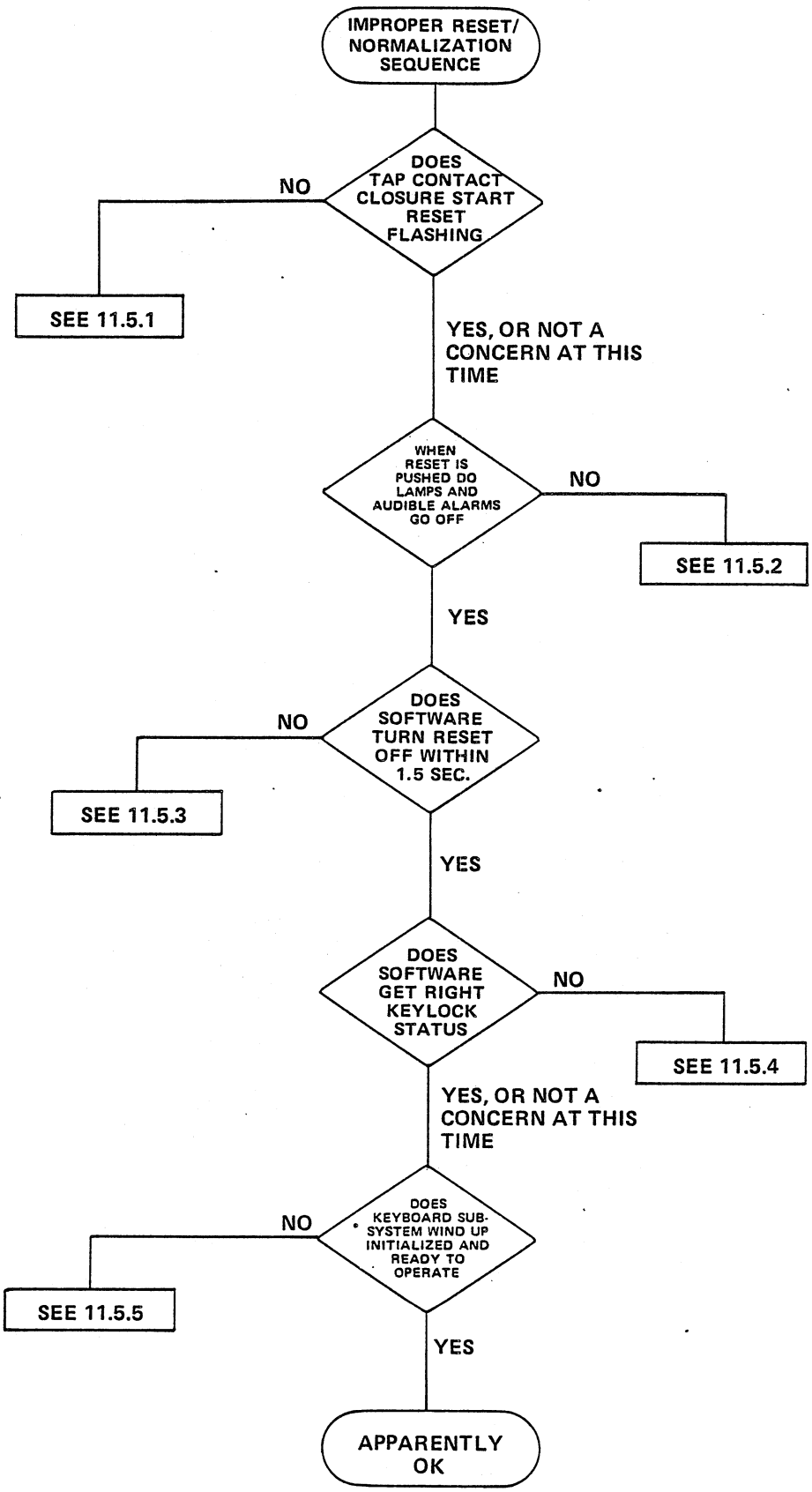

Fig. 11.5 Improper Reset/Normalization

- Keyswitch - 30731618-001.
- Cables:

  P1 - 51200884-101.

  P2 - 51200884-102.

  P3 - 51200884-103.

  P4 - 51200884-104.

12.2 Engineer's Keyboard

- Keyboard Assembly - 51400402-101.
- Keyswitch - 51190858-100.
- Cable, P5 - 51200884-105.

12.3 Light Pen

- Light Pen - 51104992-100
- Light Pen Electronics PWA - 51301970-100.
- Cable, P6 - 51200884-105.

12.4 Keyboard Electronics Assembly

- Interface PWA - 51301896-100.
- Power Supply, PS1 - 51190413-023.
- BNC Corrector, VID - 68A8721P6.
- Terminal Strip, TB1 - 43C950098P48.
- Terminal Strip, TB2 - 51190603-202.
- Switch, SW1 - 51190559-101.
- Fuse Holder, F1 - 5190450-104.
- Fuse, 2A, F1 - 68A8519P23.
- Audible Alarm, ALM1 - 68A8549P001.
- Audible Alarm, ALM2 - 68A8459P011.
- Power Cord - 70A123253G2.
- Connector, P7 - 70A2600P101.
- Contacts, P7 - 70A2600P125.

12.5 Interface Cables

- Timer/Alarm, Single Keyboard - 4DP3AAZAC109.
- Timer/Alarm, 2-4 Keyboards - 4DP3AAZAC209.
- Serial Printer Interface, Single Keyboard - 4DP3AAZOC109.
- Serial Printer Interface, 2-4 Keyboards - 4DP3AAZOC209.
- Output to Display Generator - 4DP3AAZVB30.
- Cable Set, Display Monitor with Light Pen - 4DP3AAZVB20.
- Cable Set, Display Monitor - 4DP3AAZVB10.

12.6 Serial Printer Interface PWA

- PX4000PTTA1.

12.7 Keyboard Buffer Unit (In D. G.)

- Buffer Unit, Channel 1 - 51302122-101.
- Buffer Units, Channels 1 and 2 - 51302122-102.
- Buffer Units, Channels 1, 2, and 3 - 51302122-103.
- Buffer Units, Channels 1, 2, 3, and 4 - 51302122-104.
- Buffer PWA (one in each of up to 4 Units) - 51105713-100.
- Coaxial Cable (One per channel, from D. G. on Buffer Unit(s) to J5, J11, J17, J23 on D. G.) - 4DP2040A10002.

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