Supersedes:
None

HP MODEL 5345A
A11 SCALER ASSEMBLY
TROUBLESHOOTING PROCEDURE

This troubleshooting procedure is written specifically for A11 boards with part number 05345-60011, series 1352. The series 1340 differs in that it does not have Q9, Q10, R26, and R27. This is a minor difference and will not affect the procedure. It is important to note that this procedure assumes the problem is on the A11 board.

The troubleshooting is divided into three parts: (1) the Scaler portion, which includes all circuits to the left of the schematic's white cutouts, (2) the Sample Rate portion, and (3) the Reset portion. The Excession Gate Time Reset circuit (U1C, U22B, U3B, U14B, U14A, and U1D) was not covered because of its readily identifiable symptoms.

NOTE

U16 thru U19 are MOS circuits. Ground yourself to eliminate static charge before handling these circuits. Damage to the IC's may otherwise result.

RG/ka/WN

7/77-02

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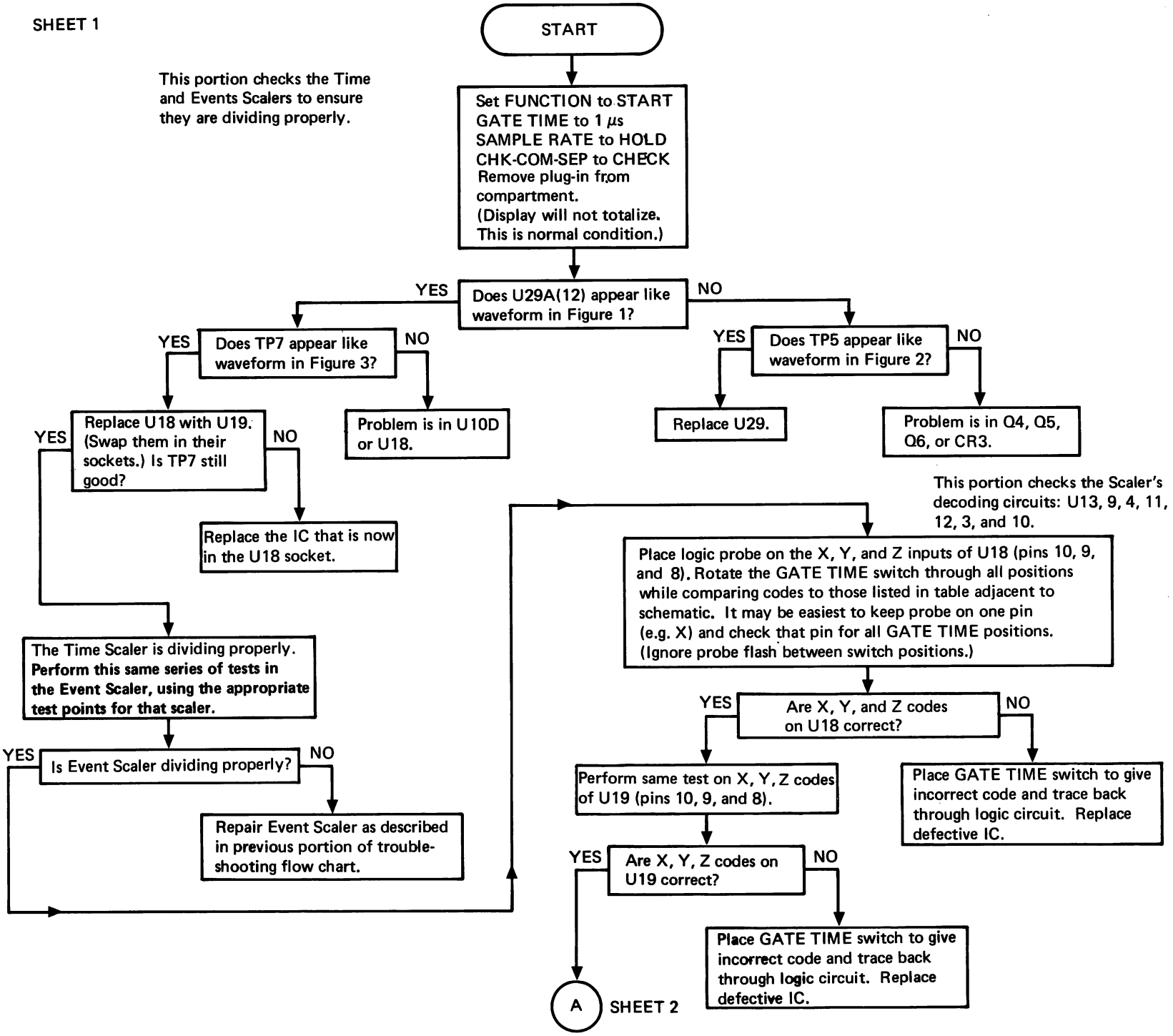
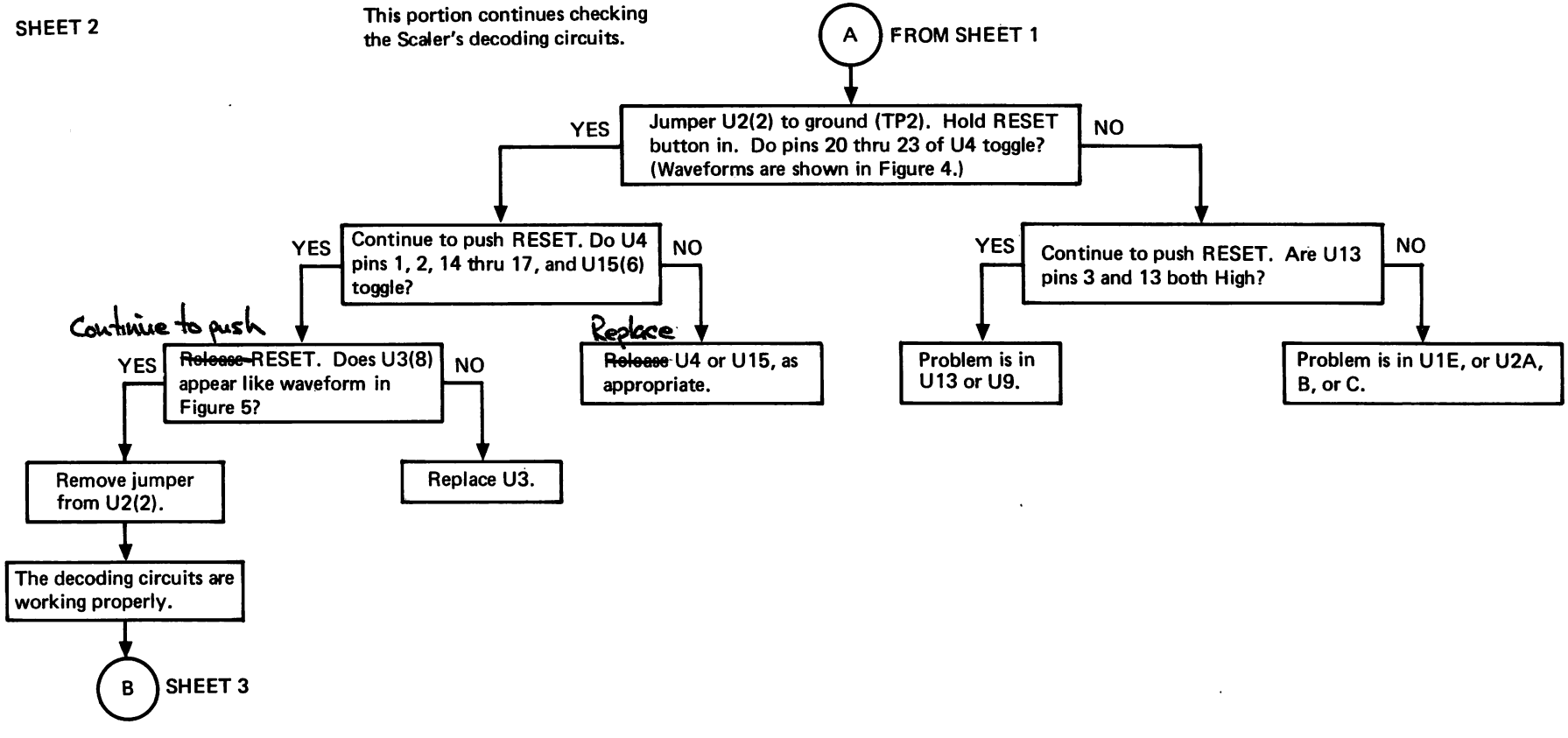
This portion checks the Time and Events Scalers to ensure they are dividing properly.



SHEET 2

This portion continues checking the Scaler's decoding circuits.



SHEET 3

This portion checks the scalers' BCD outputs.

B FROM SHEET 2

Place oscilloscope probes on U26 pins 13, 10, 6, and 3. (If possible, use AP clip and a 4-chan scope.) Trigger scope (B chan or D chan) off of U26(3); otherwise, triggering may be difficult. Rotate GATE TIME switch from 1 μs to 10 ms. Correct scope time for each setting and compare waveforms as shown in Figure 6. Waveforms will appear as shown for each setting. This checks each decade output of U18.

Do U26(13, 10, 6, 3) waveforms appear like Figure 6 for each GATE TIME setting of 1 μs to 10 ms? Push RESET and check that all outputs go Low for each gate time setting.

YES

Replace U18 with U19. (Swap them in their sockets.) Does U26 (13, 10, 6, 3) appear like waveforms in Fig. 6 for each GATE TIME setting of 1 μs to 10 ms? Check RESET.

NO

Replace the IC that is now in the U18 socket.

YES

Place U17 in the U18 socket. (Swap U17 and U18.) Does U26 (13, 10, 6, 3) appear like waveforms in Figure 6 for each GATE TIME setting of 1 μs to 10 ms? Check RESET.

NO

Replace the IC that is now in the U18 socket.

YES

Place U16 in the U18 socket. (Swap U16 and U18.) Does U26 (13, 10, 6, 3) appear like waveforms in Figure 6 for each GATE TIME setting of 1 μs to 10 ms?

NO

Replace the IC that is now in the U18 socket.

YES

C SHEET 4

NO

Is only the "A" output bad? (U26 pin 13)

NO

Replace U18.

YES

Is the "A" output bad in the 1 μs GATE TIME position?

NO

YES

In this position, the "A" output comes from U29B, U21D, and U20C. U29B is a ÷ 2 circuit. U21E(10) should be high. Check for failure in this area.

Set GATE TIME to 10 μs. Is "A" signal present at U18(15)?

YES

NO

Problem is in U21A or U20D. Check signal in that circuit.

Replace U18.

SHEET 4

C FROM SHEET 3

Set scope TIME/DIV to .2 μs/DIV. U29A(9, 2) and U22A(9, 2) should appear like B&C waveforms in Figure 6. If not, replace U29 or U22 as appropriate. Also, check that QB, QC, and QD outputs go Low with RESET.

The following procedure checks U25 and U26.

To check that the "0" data lines are being transferred to the "Z" outputs, set the GATE TIME switch to 100 ns and check that the Z output is an inverted version of the appropriate input, as follows:

Chan A Scope Probe	Chan B Scope Probe
U26(12)	U26(4)
U26(5)	U26(7)
U26(11)	U26(9)
U26(14)	U26(12)

(Perform same test on U25) U25 output is noninverting.

To check that the "1" data lines are transferring correctly, set the GATE TIME switch to 10 μs and perform same test as above, as follows:

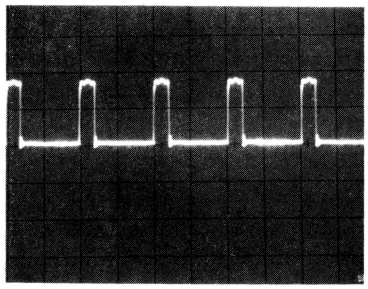
Chan A Scope Probe	Chan B Scope Probe
U26(3)	U26(4)
U26(6)	U26(7)
U26(10)	U26(9)
U26(13)	U26(12)

(Perform same test on U25)

The following procedure checks U23, U24, U27, and U28.

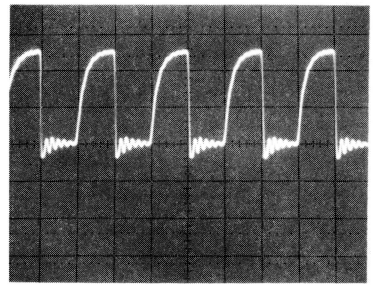
The last IC's to check are U23, 24, 27, and 28. These transfer data from the ÷ 10 on A9. To test, set SAMPLE RATE pot. to max. ccw and jumper TP4 and TP5 to ground (TP2). Use a logic probe to check for toggling on inputs and outputs of U24 and U28. (U23 and U27 are ECL to TTL converters).

Figure 1



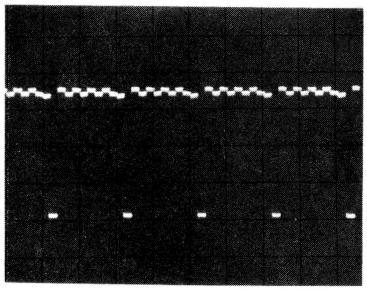
U29A(12) .2V/DIV, .5 μS/DIV,
+ SLOPE, + POLARITY, DC

Figure 2



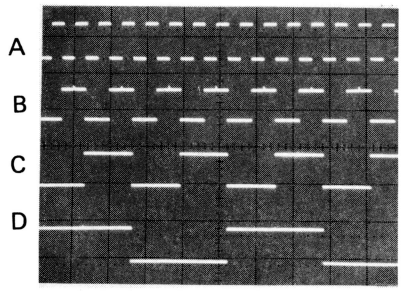
TP5 .2V/DIV, .1 μS/DIV,
+ SLOPE, + POLARITY, DC

Figure 3



TP7 .2V/DIV, 50 mS/DIV,
+ SLOPE, + POLARITY, DC

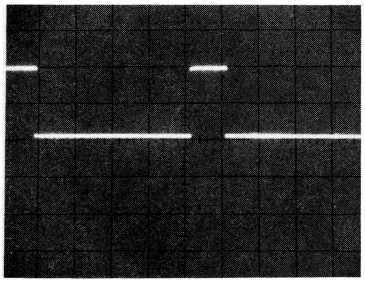
Figure 4



.5V/DIV, .2 mS/DIV,
+ SLOPE, + POLARITY, DC

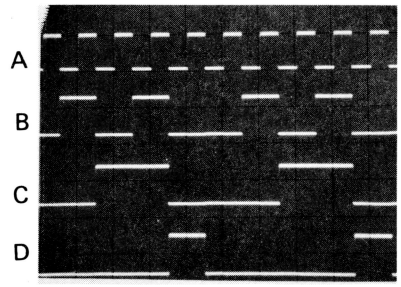
A = U4 Pin 23
B = U4 Pin 22
C = U4 Pin 21
D = U4 Pin 20

Figure 5



U3(8) .2V/DIV, .2 mS/DIV,
+ SLOPE, + POLARITY, DC

Figure 6



.2V/DIV, – SLOPE, + POLARITY,
DC, CHOP or ALT (as needed)

A = U26(13)
B = U26(10)
C = U26(6)
D = U26(3)

5345A GATE TIME	SCOPE TIME/DIV
1 μS	2 μS
10 μS	20 μS
100 μS	.2 mS
1 mS	2 mS
10 mS	20 mS

SAMPLE RATE TROUBLESHOOTING

Set: FUNCTION switch to FREQ A

SAMPLE RATE to max CCW

CHK-COM-SEP to SEP

GATE TIME to 100 μs

Turn counter on.

1 If the ARM light does not come on, check that U20B(6) is Low (result of power-up reset; gives first arm signal) and that U5B(8) is High. U5A(6) should now be Low.

2 If the ARM light comes on, place logic probe on U5B(10) and set CHK-COM-SEP switch to CHECK. If a problem exists in the normal sample rate circuitry, the counter will gate once but will not rearm. If the logic probe indicates a Low level, replace U5. Otherwise, the problem is in the sample rate circuit of U6A, U1B, Q7, Q8, and U2C. Return switch to SEP position, push RESET, and troubleshoot the circuit statically (U2C(8) should be Low).

3 If the counter is arming and gating correctly in FREQ A but does not work in START, check U3A and that U5B pin 12 is held Low through CR8.

RESET CIRCUIT TROUBLESHOOTING

A reset condition can be generated by any one of the following conditions:

1. Changing FUNCTION switch setting.
2. Changing GATE TIME switch setting.
3. Changing DISPLAY POSITION switch setting.
4. Pressing RESET pushbutton.
5. Power up reset (POWER switch set to ON).

Place a logic probe on U7D(11) and try different reset methods. If they all cause a reset but one does not, the following gates are associated with the function.

FUNCTION switch	U7C
GATE TIME switch	U7B
DISPLAY POSITION switch	U7B
RESET pushbutton	U15(D) and U6D
Power up reset	CR9, C6

If no reset condition exists at U7D(11), check that U1F(12) and U8(6) go Low when the FUNCTION switch is changed.

If all reset conditions exist at U7D(11), check that U6C(8) and U15A(2) go Low when a reset is generated.