

CUSTOM MODIFIED PRODUCTS

PRODUCT	MOD	DESCRIPTION
7B53A	FB	A Gated X-Y mode is added to provide sweep-gated unblanking, triggerable from the external deflection signal.
7B53A,AN	178H	The instrument has a front-panel-selected Alternate Sweep mode providing alternate main and delayed sweep displays in the former INTENS operating mode (only). The Mixed Sweep feature has been deleted.
7B53A,AN	769G	Added Delay Gate & Delayed Sweep Gate outputs via interface conn.
7B53A,AN	816J	It provides Main Trig. In and Delayed Trig. In connectors paralleled to the rear interface connectors C1 and C2.

W A R N I N G

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY.
TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

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7B53A

MOD FB

MODIFICATION INSERT

7B53A
MOD FB

This manual insert describes MOD FB as it applies to the TEKTRONIX 7B53A Dual Time Base plug-in unit. A Gated X-Y mode is added to provide sweep-gated unblanking, triggerable from the external deflection signal.

Gated X-Y. A latching ("push-push") switch is added concentric with the POSITION control to provide operator selection of Time Base (in) and Gated X-Y (out) modes. In the Time Base mode (switch in), all operation and functions of the unit are normal (including the AMPL position of the TIME/DIV control). In the Gated X-Y mode (switch out), operation is as follows:

Deflection Signal. The sweep sawtooth signal is disconnected from the deflection preamplifier, and the Ampl mode signal (Main Triggering signal) applied to the preamplifier.

Unblanking. The unblanking line remains driven by the time-base generator, providing crt unblanking (when the 7B53A MOD FB is installed in a Horizontal plug-in compartment) triggered from the deflection signal and having a duration of 10 to 12 times the TIME/DIV setting.

Auto Mode. The Auto mode is disabled during Gated X-Y operation to minimize crt phosphor-burn hazards. The sweep must be triggered in order to provide gated unblanking.

Readout. The readout system remains driven by the TIME/DIV control, providing an indication of unblanking duration.

Gated X-Y Operation

With the GATED X-Y switch pushed in, the 7B53A MOD FB operates normally. With the GATED X-Y switch out, the 7B53A MOD FB horizontal preamp is switched from the Time Base to the Amplifier mode. The Main Triggering signal is applied to the preamp and becomes the X-axis signal.

Z-axis unblanking is provided by the sweep gate signal. Therefore, it is necessary that the sweep is triggered as indicated by the TRIG'D lamp. Z-axis unblanking duration is determined by the TIME/DIV and VARIABLE controls.

CALIBRATION

Calibrate the 7B53A MOD FB according to the procedure in the Calibration section of the Service Manual, and the following steps.

- a. Push the GATED X-Y switch to the in position.
- b. Set the TIME/DIV control to 50 ms.
- c. Apply a 2-Hz sine-wave signal to both vertical inputs.
- d. Set the left vert to dc, the right vert to ac, and the mainframe TRIG SOURCE to RIGHT.
- e. Set the 7B53A MOD FB MAIN TRIGGERING to NORM, AC, and INT, and trigger the sweep.

- f. Adjust the VARIABLE TIME/DIV control for one cycle over the full sweep duration.
- g. Set the GATED X-Y switch out (X-Y mode), and adjust the VARIABLE TIME/DIV control for exactly one cycle of X-Y display (no gap or overlay).
- h. Set the MAIN TRIGGERING MODE switch to SINGLE SWP and press RESET. Note that one cycle of X-Y signal is displayed.

PARTS LIST

Electrical

Change To:

R727	315-0152-00	RESISTOR, FXD, CMPSN, 1.5 k Ω , 5%, 0.25 W
R735	315-0132-00	RESISTOR, FXD, CMPSN, 1.3 k Ω , 5%, 0.25 W

Delete:

CR728	152-0141-02	SEMICOND DEVICE, DI, SILICON, 30 V, 50 nA
R8	311-1162-00	RESISTOR, VAR. NONWW, 2 x 10 k Ω , 10%, 1 W

Mechanical

Add:

175-0529-00	2	CABLE ASSEMBLY, 1" LONG
175-0529-00	1	CABLE ASSEMBLY, 2-1/2" LONG
175-0827-00	1	CABLE ASSEMBLY, 10" LONG
175-0829-00	1	CABLE ASSEMBLY, 11-1/2" LONG

Change To:

034-0779-00	1	FRONT PANEL
366-1059-01	1	PUSH BUTTON
366-1215-00	1	KNOB -- POSITION

X-Y ETCHED CIRCUIT BOARD ASSEMBLY

Electrical

CR801	152-0141-02	SEMICOND DEVICE, DI, SILICON, 1N4152
CR802	152-0141-02	SEMICOND DEVICE, DI, SILICON, 1N4152
CR803	152-0141-02	SEMICOND DEVICE, DI, SILICON, 1N4152
Q801	151-0302-00	TRANSISTOR, SILICON, NPN, 2N2222A, TO-18
Q802	151-0302-00	TRANSISTOR, SILICON, NPN, 2N2222A, TO-18
Q803	151-0302-00	TRANSISTOR, SILICON, NPN, 2N2222A, TO-18

INSTRUCTION MANUAL

MODIFICATION INSERT

Serial Number _____

7B53A/7B53AN

MOD 178H

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7B53A/7B53AN
MOD 178H

7B53A/7B53AN
MOD 178H

This manual insert describes the features of MOD 178H as it applies to the 7B53A/7B53AN Dual Time Base plug-in unit. The instrument has a front-panel--selected Alternate Sweep mode providing alternate main and delayed sweep displays in the former INTENS operating mode (only). The Mixed Sweep feature has been deleted.

MIXED SWEEP. The Mixed Sweep mode has been deleted, and the push-pull action of the TIME/DIV VARIABLE control has been converted to control the X10 Magnifier.

ALTERNATE. The TIME/DIV knob has been changed from Pull For Intens to Pull For Alt, and internal electronic switching circuits added, to function as follows:

1. In Normal and Delayed modes, same as in standard 7B53A/7B53AN.
2. With the Delayed Sweep TIME/DIV knob pulled to its Out position, the display is switched at the end of each operation of the Main Sweep between the Main Sweep Generator (Intensified mode) and the Delayed Sweep Generator (Delayed display).

TRACE SEPARATION. The MAG pushbutton has been replaced by a TRACE SEP control, functioning only in the Alt mode to provide continuously variable vertical displacement of the Main Sweep (Intensified) trace from essentially zero to at least 4 major divisions above its normal location. The Delayed Sweep position is not displaced from the position set by the Vertical system plug-in units.

INTENSITY. An Intensity control knob is provided, concentric with the added TRACE SEP control, varying the intensity of the intensified zone of the Main Sweep in the Alt mode and of the Delayed Sweep in the Alt and Dly'd modes.

$\div 2$ ALTERNATION. An internal jumper is provided to permit sweep alternation only after each two operations of Sweep A, to permit display of all alternated Vertical traces against each time-base and to facilitate alternate operation with a second plug-in unit in oscilloscopes having two Horizontal compartments.

CHARACTERISTICS

ALTERNATE SWEEP

Horizontal/Vertical Alternation. With the internal jumper set for normal alternation, no slaving relationship exists between Alternate switching between Vertical compartments (or between channels of a dual-trace plug-in in one compartment) and switching of sweeps; if the two Vertical compartments are set to Alt mode, the two compartments will be paired with the two sweeps, but which compartment is paired with which sweep is a matter of chance. The Sweep/ Vertical compartment also applies whether even or odd numbers of traces are displayed by multiple-trace plug-ins operated in the Alternate mode. The alternated sweeps will pair with the alternated channels of a multi-trace plug-in unit only if the oscilloscope Vertical switching mode is not in the Alt mode. (If the internal jumper is set to $\div 2$, all Vertical traces will be displayed on each sweep).

7B53A/7B53AN
MOD 178H

Delayed Sweep Operation. It is not necessary that the Delayed Sweep actually operate to maintain a display in the Alt mode, the display alternation being controlled by the Main Sweep generator

READOUT. In instruments with CRT readout facilities in the Alt time base mode, the Main Sweep Time/Div readout occurs in the upper right-hand corner of the CRT; the Delayed Sweep readout is located in the lower right-hand corner.

COMPATIBILITY. This plug-in unit is primarily intended for operation in oscilloscopes having only one Horizontal plug-in compartment. It is compatible for use with oscilloscopes having two Horizontal compartments; however, except in the Tektronix 7704A and 7904 Oscilloscopes, there will be no vertical separation of the alternated Main and Delayed Sweep traces. In the 7704A and 7904, satisfactory trace separation will be obtained only in A, B and ALT horizontal modes (not CHOP).

CIRCUIT DESCRIPTION

Readout is controlled by transistors Q283 and Q284 in the following manner. With S252 in the DLY'D position, +5V is applied through diode CR282 to the base of Q283, turning it off and thus enabling the Delayed Sweep Readout. Likewise, Q284 is biased on which applies approximately +3V to R188, disabling the Main Sweep Readout. With S252 in the MAIN position, Q283 is turned on and Q284 is turned off, which enables the Main Sweep Readout and disables the Delayed Sweep Readout.

When the Delayed Sweep TIME/DIV knob is pulled out (ALT position), +5V is applied through P251-2 to U275A and transistors Q273 and Q291. The Main Sweep holdoff signal is applied to pin 3 of U275A and triggers U275A at the Main Sweep repetition rate. A positive going hold-off signal applied to pin 3 of U275A sets pin 5 at it's high state and pin 6 at it's low state. Q286 is off and it's collector is at -15V, holding the Main Sweep gating diodes CR281 and CR283 off so the Main Sweep is not displayed. A low state at pin 6 of U275A turns Q287 on and couples +5V through CR291 to the Delayed Sweep gating diodes CR263 and CR265, enabling the Delayed Sweep and causing it to be displayed. The plus signal from U275A, pin 5 is coupled to the base of Q273, turning it on and holding it's collector near zero. Thus no signal is coupled to J3, B16.

The next positive-going hold-off signal at pin 3 of U275A switches pin 5 low and pin 6 high. This turns Q286 on and applies +5V through CR276 to the Main Sweep gating diodes CR281 and CR283, allowing the Intensified Main Sweep to be displayed. With pin 6 of U275A at it's high state, Q287 is turned off allowing it's collector to go to -15V, which holds the Delayed Sweep gating diodes off, causing no Delayed Sweep display.

The low-state signal from pin 5 of U275A is also coupled through CR302 to the base of Q273, turning it off. This causes the collector of Q273 to rise to a level set by the TRACE SEP control, R6B. This +DC level, which corresponds to the Intensified Main Sweep, is coupled through CR270 to J3, B16 (Aux Y-Axis line), the vertical amplifier. Thus, when in the ALT MODE, the Intensified Main Sweep is positionable by the TRACE SEP control.

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MOD 178H

Transistors Q295, Q301, Q302 and IC U275 comprise the hold-off output circuit. With the NORM/2 switch in the NORM position, Q301 emitter is connected to B+ through R299. Q295 becomes disabled and Q301 and Q302 provide a hold-off signal to B4 for every hold-off signal received from the Main Sweep generator. The vertical display is switched at the end of each operation of the Main Sweep generator, so that the Intensified Main Sweep and the Delayed Sweep are displayed on different vertical channels.

With the NORM/2 switch in the 2 position, Q295 becomes the circuit that provides the voltage and signal path for Q301. The Main Sweep hold-off is coupled through CR293 to pin 11 of U275B. This sets pin 9 of U275B to it's high state turning Q295 off. The collector of Q295 drops, carrying the emitter of Q301 with it. The collector of Q301 goes negative turning Q302 on, which causes the collector of Q302 to rise to +4V, thus providing a hold-off signal to B4.

The next Main Sweep hold-off signal arriving through CR293 switches pin 9 of U275B to the low state, turning Q295 on. The collector of Q295 rises, driving Q301 on hard. The collector of Q301 goes to a +4.5 volt level, turning Q302 off with it's collector dropping to 0 volts. The next Main Sweep hold-off signal again provides a plus signal to the collector of Q302. This 2 mode allows both Intensified and Delayed sweeps to be displayed on each vertical channel.

Transistor Q291 provides an output slaving pulse for 7400 and 7600 mainframes with custom mod 178J (Alternate Slaving).

In the MAIN SWEEP only mode and the DLY'D SWEEP only mode, the sweep gating diodes CR281, CR283 and CR263, CR265 are controlled as in the standard instrument.

7B53A/7B53AN
MOD 178H

Parts List
ELECTRICAL

RESISTORS	Delete	R262, R263, R264, R280, R281, R627, R657, R658, R680, R681, R682, R683, R684, R685, R686, R687 and R689.
CAPACITORS	Delete	C280, C683, C689, C706 and C710.
DIODES	Delete	CR186, CR187, CR188, CR654, CR677, CR678.
TRANSISTORS	Delete	Q262, Q280, Q656, Q678, Q682, Q684 and Q688.

CAPACITORS

C533	Change	283-0114-00	.0015 μ f	Cer.	200V
C639	Change	283-0000-00	.001 μ f	Cer.	500V
C643	Change	283-0000-00	.001 μ f	Cer.	500V
C291	Add	283-0032-00	470pf	Cer.	500V
C295	Add	283-0164-00	2.2 μ f		25V

SEMICONDUCTOR DEVICE, DIODE

CR255	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR270	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR276	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR277	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR278	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR279	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR282	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR284	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR286	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR291	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR293	Add	152-0071-00	15V	
CR294	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR301	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR302	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR303	Add	152-0141-02	Silicon	Replaceable by 1N4152
CR304	Add	152-0141-02	Silicon	Replaceable by 1N4152

TRANSISTORS

Q273	Add	151-0190-00	Silicon	2N3904
Q283	Add	151-0220-00	Silicon	2N4122
Q284	Add	151-0220-00	Silicon	2N4122
Q286	Add	151-0220-00	Silicon	2N4122
Q287	Add	151-0220-00	Silicon	2N4122
Q291	Add	151-0190-00	Silicon	2N3904
Q295	Add	151-0220-00	Silicon	2N4122
Q301	Add	151-0220-00	Silicon	2N4122
Q302	Add	151-0220-00	Silicon	2N4122
Q304	Add	151-0190-00	Silicon	2N3904

RESISTORS

R6A,B	Add	037-0067-00	5K X 10K	Intensity, Trace Sep.
R7	Add	315-0822-00	8.2K, 1/4W, 5%	
R8	Add	315-0182-00	1.8K, 1/4W, 5%	
R144*	Change	037-0068-00	20K Var.	10X Mag/Var Time/Div.

* Furnished as a unit with S144.

7B53A/7B53AN

MOD 178H

PARTS LIST

ELECTRICAL

RESISTORS (continued)

R261	Change	315-0103-00	10K 1/4W, 5%
R272	Add	315-0471-00	470Ω 1/4W 5%
R273	Add	315-0472-00	4.7K 1/4W, 5%
R274	Add	315-0102-00	1.0K 1/4W, 5%
R275	Add	315-0202-00	2.0K 1/4W, 5%
R278	Add	315-0472-00	4.7K 1/4W, 5%
R279	Change	315-0103-00	10K 1/4W, 5%
R282	Add	315-0472-00	4.7K 1/4W, 5%
R283	Add	315-0103-00	10K 1/4W, 5%
R284	Add	315-0103-00	10K 1/4W, 5%
R285	Add	315-0102-00	1K 1/4W, 5%
R286	Add	315-0471-00	470Ω 1/4W, 5%
R287	Add	315-0471-00	470Ω 1/4W, 5%
R288	Add	315-0103-00	10K 1/4W, 5%
R289	Add	315-0202-00	2K 1/4W, 5%
R291	Add	315-0302-00	3K 1/4W, 5%
R292	Add	315-0103-00	10K 1/4W, 5%
R293	Add	315-0102-00	1K 1/4W, 5%
R294	Add	315-0102-00	1K 1/4W, 5%
R295	Add	315-0102-00	1K 1/4W, 5%
R296	Add	315-0152-00	1.5K 1/4W, 5%
R297	Add	315-0101-00	100Ω 1/4W, 5%
R298	Add	315-0472-00	4.7K 1/4W, 5%
R299	Add	315-0471-00	470Ω 1/4W, 5%
R300	Add	315-0103-00	10K 1/4W, 5%
R301	Add	315-0153-00	15K 1/4W, 5%
R302	Add	315-0102-00	1K 1/4W, 5%
R304	Add	315-0102-00	1K 1/4W, 5%
R305	Add	315-0102-00	1K 1/4W, 5%

SWITCHES

**S144A,B,	Change	to S144A,B,C,D.		
S295	Add	260-1641-00	DPDT	NORM ÷ 2

** 7B53A only. Furnished as a unit with R144.

INTEGRATED CIRCUITS

U275A,B	Add	156-0041-00	2N2474N
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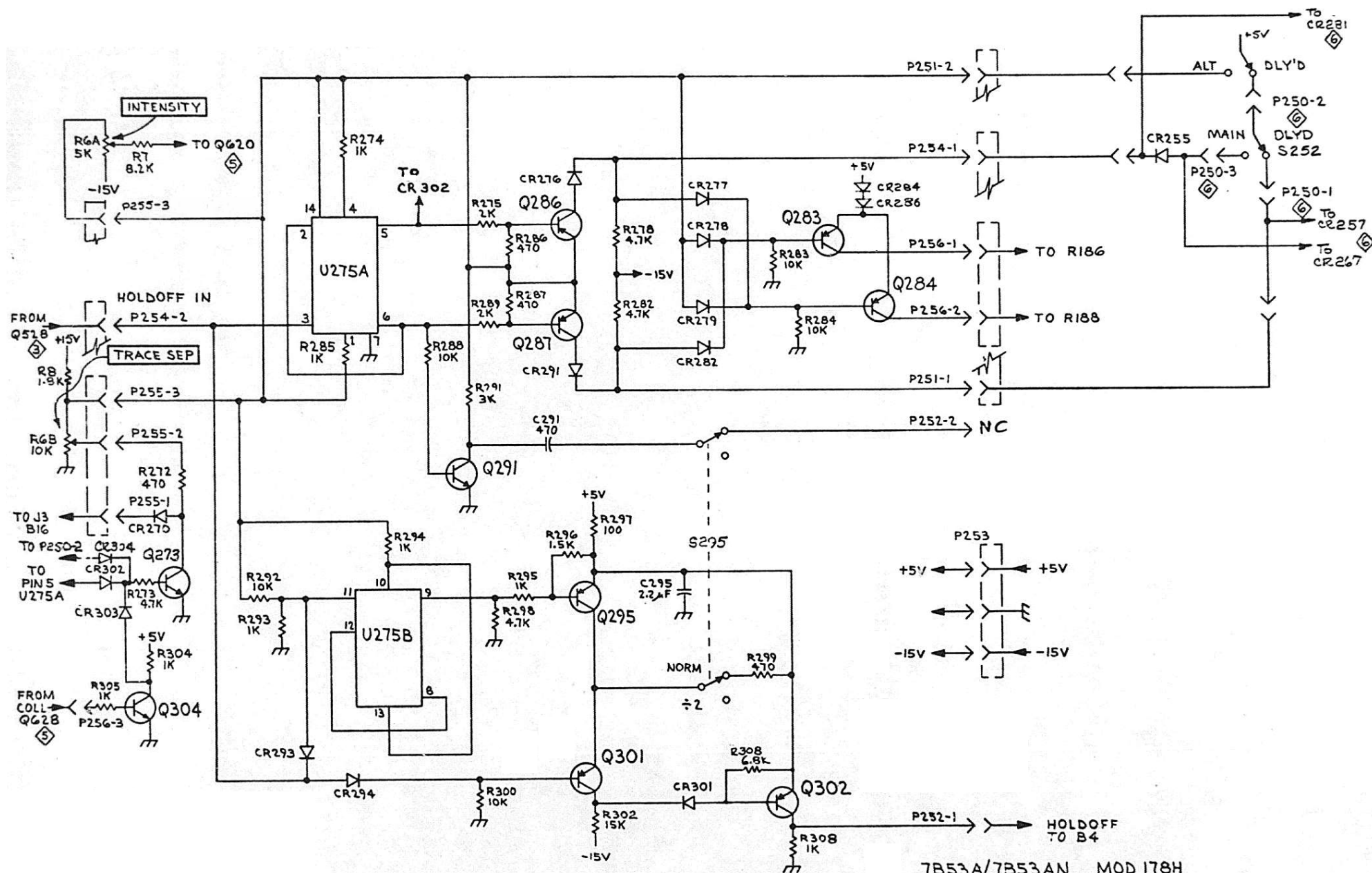
7B53A/7B53AN

MOD 178H

PARTS LIST

MECHANICAL

Actuator, Cam Switch	Delete	1	105-0340-00
Pushbutton	Delete	1	366-1257-93
Coupler, half	Delete	1	376-0092-01
Coupler, half	Delete	1	376-0093-03
Shaft, extension	Delete	1	384-1059-00
Shaft, extension	Delete	1	384-1101-00
Frame, pushbutton	Delete	1	426-0681-00
Bracket, Pot	Change	1	030-0758-04
Subpanel, Front	Change	1	030-0760-04
Panel, Front	Change	1	034-0613-00
ECB, Alternate Sweep	Add	1	037-6206-00
Post, stud w/4-40 tap	Add	2	129-0236-00
Knob, charcoal	Change	1	366-1077-00
Knob, interlock ALT,DLYD	Change	1	366-1321-00
Knob, grey,small	Change	1	366-1391-00
Shaft, coupler	Add	1	376-0039-00



7B53A/7B53AN MOD 178H
ALTERNATE SWEEP

INSTRUCTION MANUAL

MODIFICATION INSERT

Serial Number _____

7B53A/7B53AN
MOD 769G

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7B53A/7B53AN
MOD 769G

7B53A/7B53AN MOD 769G

This manual insert describes the features of MOD 769G as it pertains to the 7B53A/7B53AN Dual Time Base plug-in unit. The unit is equipped with added Delay Gate and Delayed Sweep Gate output signals, via contacts B9 and A22 respectively of the interface connector, for use in the 7403N MOD 769H and 76C3 MOD 769H, or other similarly modified oscilloscopes.

OUTPUT SIGNALS

Delay Gate. A Delay Gate pickoff circuit has been added, providing a 5 V lockout signal via interface contact B9 corresponding to the duration of the calibrated delay period during Main Sweep operation in Intensified, Delay and Mixed Sweep operating modes.

Delayed Sweep Gate. A +5 V Delayed Sweep Gate signal, coincident with each operation of the Delayed Sweep, is provided via interface pin A22.

CHARACTERISTICS

COMPATIBILITY. The unit is normally compatible with all 7000 Series Oscilloscopes. Utilization of the added Delayed Sweep Gate output at contact A22 is provided only in the 7403N MOD 769H or 76C3 MOD 769H (for rear-panel output) or other modified oscilloscopes. The Delay Gate signal may be used by Gate Output facilities in 7700 and 7500 Series Oscilloscopes, or as a sweep delay lockout for a second sweep generator in the Sweep B compartment of a four-plug-in oscilloscope (7704, 7515 7504, etc) when this unit is installed in the Sweep A compartment.

OUTPUT SIGNALS. Output signal rise and fall times are 50 ns or less for normal 7000 Series interface loading. Because the signals are used only as logic levels and are processed for external output by switching amplifiers, transient response aberrations are unspecified.

CALIBRATION

1. Install the unit in a 7000 Series oscilloscope mainframe, using a plug-in extender.

2. Turn the instrument on and set the plug-in unit TRIGGERING MODE to AUTO, MAIN TIME/DIV to 1 ms and DELAYED TIME/DIV to 50 μ s INTENSIFIED.

3. Check the interconnecting socket for the following output signals:

a. A22 - Delayed Sweep Gate out approximately +4.5 to +5 volts out for duration of intensified zone.

b. B9 - Delay Gate. Out approximately 5 volt negative-going gate coincident with beginning of intensified zone.

7B53A/7B53AN
MOD 769G

PARTS LIST
Electrical

CAPACITORS

C586	Add	290-0136-00	2.2 μ F, Elect, 20 V \pm 20%
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DIODES

CR587	Add	152-0141-02	Silicon, replaceable by 1N4152
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TRANSISTORS

Q586	Add	152-0221-00	Silicon, PNP, replaceable by 2N4258
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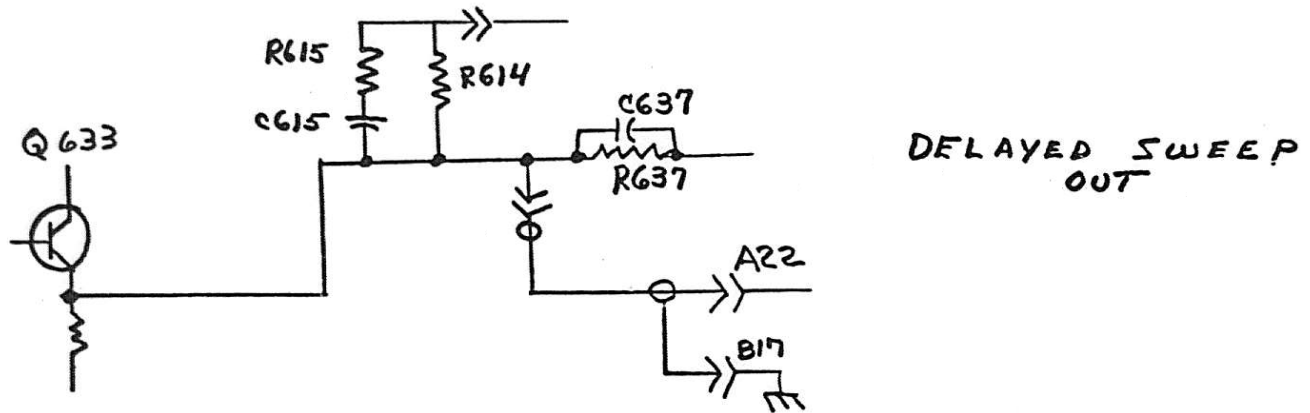
RESISTORS

R585	Add	315-0511-00	510 Ω , 1/4 W, 5%
R586	Add	315-0751-00	750 Ω , 1/4 W, 5%
R587	Add	315-0682-00	6.8 k Ω , 1/4 W, 5%
R588	Add	315-0271-00	270 Ω , 1/4 W, 5%

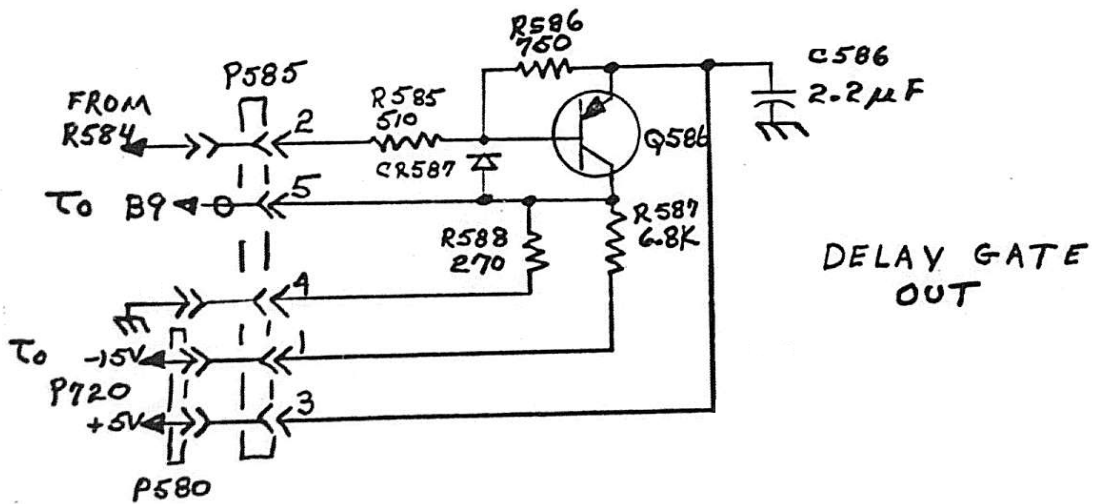
Mechanical

Circuit Board	Add	1	037-6180-00
Connector, terminal, .640" long	Add	5	131-0787-00
Socket, pin connector	Add	3	136-0252-04
Post, standoff	Add	1	129-0418-00
Connector, terminal, .365" long	Add	4	131-0608-00
Holder, 5-terminal connector	Add	1	352-0163-00
Holder, 2-terminal connector (red)	Add	1	352-0169-02
Holder, 1-terminal connector	Add	3	352-0170-00

7B53A/7B53AN
MOD 769G



(Partial - Delayed Sweep Generator 5)



(Partial - Main Sweep Generator 3)

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7B53A/AN

MOD 816J

MODIFICATION INSERT

7B53A/AN
MOD 816J

This manual insert describes the special features of MOD 816J as installed in the 7B53A/AN Dual Time Base unit. It provides Main Trig. In and Dly'd Trig. In connectors paralleled to the rear interface connectors C1 and C2.

Triggering. Because of the considerable length of coaxial cable in the plug-in and oscilloscope, standing-wave effects will cause material variation in triggering sensitivity for certain frequencies unless care is taken to avoid these effects. Normal external triggering bandwidth and sensitivity are preserved by terminating input signals at the opposite connector: rear-panel inputs should be terminated at the front panel; front-panel inputs should be terminated at the rear.

PARTS LIST

The following changes should be made to the Mechanical parts list. When ordering replacement parts, specify instrument type, MOD number, part number and a description of the desired item.

Connector, Amp coaxicon, assy	Add	2	175-1020-00
Clamp, cable	Change	2	343-0213-00
Label, ID	Add	1	344-1277-00

