INTERNAL TECHNICAL REPORT NO. 170

MAX CRUISE MOD BLOCK DEFINITION

PROGRESS REPORT

Velocity — Synchros [illegible] aircraft on MAX CRUISE
Nav Computer

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INTRODUCTION

This note defines the hardware modifications to the AFCS recently defined for the following units -

APFD (Pitch) computer
Autothrottle computer
Pilots Control Unit
Item computer
SFC computer
Warning & Landing Display computer

The report consists of 3 sections each dealing with one aspect of the modification programme -

Part A Max Cruise and the associated mods
Part B Changes to the Glide control law and Go-Around logic
Part C Changes to SFC interlocks

List of Figures

PART A

0. INTRODUCTION

This note defines the hardware modifications to the AFCS resulting from and associated with the new Max Cruise control law.

The report contains a section for each unit modified –

1. APFD (Pitch) computer
2. Autothrottle computer
3. Pilots Control Unit
4. ITEM Computer
5. AFCS wiring

Under each computer heading the details of the relevant DCR's are listed. Diagrams showing the system configuration and the implemented circuits are shown for each aspect of the modifications with an indication of the modules affected.

The modifications included consist of the following -

0.1. APFD (Pitch) Computer (Creation of computer type 41-001-08)

- DCR 11002 Iss. 2 Max Cruise Control law
- DCR 10099 (FD gain increased in LAND)
- DCR 11003 (a) Elimination of false Alt. Alert warnings in approach,
  (b) Correction of Alt. Acquire scaling
- DCR 11004 (e) Logic solution to loss of EXT mode in Land.
- Latching of Alt. Acquire sign sensors after capture
- Correction of D.I. jumping

0.2. Autothrottle computer (Creation of computer 42-001-06)

- DCR 10646 (Max Cruise computing)

0.3. Pilots Control Unit (Creation of unit 20-001-04)

- DCR 10952 (Change of Max Op and Max Op Soft captions)
- DCR 10953 (Max Cruise indicator)

0.4. ITEM Computer (Creation of computer 59-017-07)

- DCR 10827 (Special Interface for WLD -15v)
- DCR 10828 (IFM change to correspond to DCR 10751)
- DCR 10829 (Improvement to IFM AT debug routine)
- DCR 10830 (Max Cruise modifications)

1. APFD (PITCH) COMPUTER

The modifications included comprise the following

MOD 1265

1.1. DCR 11002 Iss. 2 Incorporation of new Max Cruise control law

- as defined in SNIA report of 23.1.76 and minutes of meeting with SNIAS on 10.2.76.

The following telexes are also applicable

No. 14 of 23.2.76	MEA telex 6536 of 16.2.76
No. 9 of 25.2.76	MEA telex 6543 of 26.2.76
No. 11 of 19.2.76	MEA telex 6546 of 2.3.76
No. 12 of 26.2.76	MEA telex 6563 30.3.76
No. 11 of 23.3.76	

The new Max Cruise control law replaces the existing $\dot{V}$ control with an $\dot{h}$ control supplemented by filtering of the VMO/MMO error. An analogue output of VMO/MMO error plus a 5.4 kts offset is transmitted to the Autothrottle for Cruise control.

The Autothrottle can be engaged into the standby condition when the APFD is engaged in Max Climb mode - this is achieved by the 'Cruise mode logic', 'Speed Mode inhibit logic' and 'AAP + VMO logic'.

The following diagrams illustrate (a) the system concept and (b) the implemented circuit.

Fig. 1-1-1 Analogue computing
1-1-2 AAP + VMO logic output
1-1-3 Cruise logic
1-1-4 Speed mode inhibit

Fig 1-1-1 illustrates the analogue computing. The analogue signal from the ADC (Vc - VRC) is used in a similar manner as at present to control the aircraft in Max Climb. For Max Cruise a second-order filter term is included in the Vc - VRC chain. To this is added an $\dot{h}$ component which has been synchronised to zero before Max Cruise is engaged. An $\dot{h}$ offset of 600'/min is also added (provided that none of the throttle levers is at maximum) to facilitate the speed control at the 50,000' VMO/MMO corner. A Vc - VRC level switch set to 5.4 kts (with 2.7 kts hysteresis) is used to clutch the Autothrottle in overspeed conditions. The analogue output to the Autothrottle is offset by 5.4 kts to ensure control is maintained at M0.02

above the ADC datum of M 2.00. The FTCM rate limit is increased to 0.1 g/sec in all modes. Datum adjust authority remains as at present.

Fig. 1.1.2 shows the modified AAP logic output to the Autothrottle. A time delay of 100μsec has been added to ensure that at the end of CRUISE when, say, Pitch is selected that AP Speed Mode disappears before AAP + VMO. If it did not do so then the Autothrottle would disconnect due to AP Speed Mode being present without AAP + VMO.

Fig. 1.1.3 illustrates the CRUISE logic. The signal CRUISE is generated under the following logical conditions -

ADC interlock. VMO encoded.(Priority + Servo Inhibit)

<u>or</u> Cruise B from other AP. $\overline{\text{Priority}}$. $\overline{\text{Servo inhibit}}$

Cruise B is generated from

ADC interlock and VMO mode encoded, and is used in the opposite APFD computer to ensure mode switching and lamp illumination compatibility. It is also used, together with 'priority' to remove the Pitch Command Bars if this APFD is not in control.

The logic ensures compatibility with the Autothrottle under two conditions -

With one autopilot engaged in CRUISE engagement of the opposite Autopilot should result in the selection of PITCH hold mode and both autothrottles remain in standby. Under the original scheme the priority signal was temporarily absent during the changeover and as a consequence the generation of the signal CRUISE was lost in the system being engaged. This resulted in the associated Autothrottle system reverting to IAS Hold with the other autothrottle remaining in standby (Mach Hold). The present logic utilises the servo inhibit signal to replace the absent priority signal, thus ensuring that both autothrottles encode the same mode.

With FD1 (or FD2) engaged in CRUISE selection of AP2 (or AP1) should revert the system to Pitch Hold. However, because of the inherent time delays involved in performing this changeover it was possible for the autothrottle systems to encode different modes in each channel. The present logic ensures that conditions are identical in both APFD channels (via the CRUISE B signal) long enough for both autothrottle systems to end up in the same mode (Mach Hold).

The datum adjust function is inhibited (by permanently zeroing the D. I.) when in Max cruise mode.

Fig. 1.1.4 shows the Speed Mode inhibit logic. This logic inhibits the AP Speed Mode output under the following conditions -

- CRUISE signal generated (for 100 secs)
- Vc - VRC > 5.4 kts

The inhibit is removed when one of the throttle levers has reached its maximum position and Vc - VRC < 2.7 kts.

Mod 1341

1.2. DCR 10099 (Increase of FD gain by 40% in LAND and Glide Slope capture

Two new logic drives (LE + GST), S59, switch the Flight Director gains on the Output Monitor module. Fig. 1.2.1 refers.

Mod 1387

1.3. DCR 11003

(a) Elimination of false Alt. Alert warnings in approach

The analogue level switch (outer boundary) supplies two logic gates and because of the difference in thresholds of these gates a logic 'race' was occurring which occasionally resulted in Alt. Alert warnings on the approach. This has been overcome by the addition of logic gate buffers. A smoothing capacitor has also been added to reduce noise from the logic power supply on the Alt. Alert module. Fig. 1.3.1 refers.

b) Correction of Alt. Acquire scaling

The incompatible synchros used in the Altimeter (which supplies the Pilots Control Unit for Flight level reference) result in a low sensitivity at the Pitch computer interface. To correct for this the gains in the APFD (Pitch) computer have been changed in the Alt. Acq. coarse and fine and offset fine chains. The scaling to be accommodated is 265 mV/^{o} in the coarse computing and 213mV/^{o} in the fine and offset fine computing. The chopping phase reference has also been altered to 65^{o} to correct for the large phase shifts introduced by this mis-matched synchros.

SNIA note 462.277/76 and telex no. 12 of 26.2.76 recommend that the gains in the fine and offset fine computing only are altered (together with a phase shift of 65^{o}) and that the coarse sensitivity be corrected by changing the threshold of the 2500' level switch fed from the coarse error information.

This has not been done, as explained above, since the Alt. Acquire coarse input is used to compute the APFD demand in the Alt. Acquire mode and performance would remain poor if this were not corrected.
Fig. 1.3.2. refers.

Mod 1235

1.4. DCR 11004 (e) Loss of Ext mode

It had been noted in SNIA note 452.119/75 Issue 2 that a loss of the encoded External mode information (EXTM.) during LAND would cause loss of Flare which may go unnoticed by the crew and result in a hard and short landing. Various schemes to overcome this have been tried and tested on the SNIA logic simulation. The final, agreed (ref. SNIA telex no. 14 of 9.3.76 and MEA telex no. 6556 of 22.3.76) solution operates directly on the Autopilot hold coil logic such that if EXTM is not present (due to a failure) when in LAND mode and Land Engage has occurred then a disconnect results and an autochangeover into the other, healthy, Autopilot will occur. The input of EXTM encoded is necessary to ensure transient free operation until the appearance of EXTM after Glide Slope capture. Fig. 1.4.1 refers.

1.5. Latching of Alt. Acquire sign sensors

This has proved to be necessary since after Alt. Acquire capture has occurred it is possible (especially when flying close to the flight level to be captured) that the sign sensors used to signal Alt. Acquire capture conditions change state and the mode is lost leading to acquisition of an incorrect flight level.
Fig. 1.5.1 refers.

1.6. Correction of D.I. jumping

Two modifications have been incorporated to prevent the possibility of the datum 'jumping' store. A logic race condition could occur on the 'Up-Down' line resulting in an indeterminate state. This has been cured by the incorporation of sequencing logic. The second modification changes the quiescent state of the clock line from a Hi to a Lo thereby minimising the probability of noise pick up.
Fig. 1.6.1 refers.

1.7. Computer wiring

Fig. 1.7.1 lists the new computer wiring needed to incorporate these modifications. (Where pin numbers are known they are defined)

Mod 1262

2. AUTOTHROTTLE COMPUTER - DCR 10646 (Max Cruise control law)

As defined in SNIA report of 23.1.76 and minutes of meeting with SNIA on 10.2.76. The following telexes are also applicable

No. 14 of 23.2.76
No. 9 of 25.2.76
No. 11 of 19.2.76
No. 12 of 26.2.76
No. 11 of 23.3.76

MEA telex no. 6536 of 16.2.76
MEA telex no. 6543 of 26.2.76
MEA telex no. 6546 of 2.3.76
MEA telex no. 6563 of 30.3.76

The new Max Cruise control law introduces a new mode of operation into the Autothrottle with an analogue input derived from the ADC and modified within the APFD (Pitch) computer. The Autothrottle can be engaged into the standby condition when the APFD is in VMO mode utilising the existing logic which reverts the Autothrottle to standby when AAP and AP Speed mode are present. On receipt of the signal 'CRUISE' and loss of the signal 'Speed Mode' from the APFD the Autothrottle encodes Mach Hold, utilising the Vert. Nav. logic inputs, and the Autothrottle is clutched until the Speed Mode interlock returns. The Mach Hold clutch is inhibited during this period and Mach Hold lamp illuminated from the controlling system.

Fig. 2-1 illustrates the new analogue input used to connect the Vc - VRC +5.4 kts signal into the outer-loop computing. It will be noted that this input is enabled by the signal 'CRUISE enabled'.

Fig. 2-2 illustrates the logic used to encode Mach Hold from the Vert. Nav. inputs, the inhibition of Mach Hold clutch and the generation of the signal 'Cruise enable' which ensures that a single failure in the APFD Cruise logic cannot invalidate the switching of the analogue computing in the Autothrottle. The Mach Hold output (used for mode illumination) is enabled by $\overline{\text{CRUISE}}$ or Autothrottle clutched and inhibited when in CRUISE with Autothrottle not clutched.

The inhibition of the Mach Hold clutch and the signal 'CRUISE enable' are generated from 'CRUISE' and 'AAP + VMO'. The Mach Hold clutch has to be inhibited during CRUISE to isolate the ADC from the A/Th computer since the Mach Hold switching functions remain active during CRUISE.

The generation of the logic signal 'Max thrust', for use in the APFD, is achieved when any of the throttle levers has reached the maximum position, as signalled from the throttle quadrant microswitches, and the appropriate

microswitch validation level switch has operated.
The 'AP revert to pitch' output contains a delay of approx. 1 μsec - this is necessary for the case when the Autopilot is selected into another speed mode e.g. Mach Hold. When this occurs, CRUISE disappears followed by AAP+ VMO (with delay) and the Autothrottle will disconnect and the engage switch will start to drop. This will generate 'AP revert to pitch' until the engage switch has fully dropped - by re-organising the 'Engage to computing' logic within the Autothrottle and incorporating a small delay in the 'AP revert to pitch' output the logic signal can be prevented from affecting the APFD.

The new computer wiring necessary is defined in Fig. 2.3.*
(Due to the acute shortage of pins available for the new functions in the Rate Limit/Self Test/Error module stack, the ident. resistor R1 on the Error module is removed. The ident resistors R1 on the Self Test and Rate Limit modules are increased in value so that the signal 'Cruise enable' which is connected to those same pins will remain unaffected by the presence of these resistors).

3. <u>PILOTS CONTROL UNIT</u> (DCR 10952, 10953)

The captions of 'Max Op' and 'Max Op Soft' are changed to 'Max Climb' and 'Max Cruise' respectively.

The existing 'Max Op Soft' Tellite switch is changed to an indicator type 3755-00004 with associated control unit internal wiring changes. See Fig. 5.1 for associated AFCS wiring changes.

*

4. ITEM COMPUTER

The modifications included comprise the following -

- A special interface for WLD -15V to model the input of the BCII, originally wrongly defined by SNIAS.
- Provision of box wires and interfaces for 2 new input signals (AAP + VMO, Other AP SP Mode).
- Corresponding software changes implemented in modifier and necessitating expansion of same.

Refs. Twx MEA : 6419, 6422, 6497, 6529. SNIAS 6 of 19. 9. 75, 4 of 17. 10. 75 14 of 22. 12. 75, 8 of 29. 1. 76, 19 of 7. 1. 76.

5. AFCS WIRING

The changes to the aircraft wiring associated with all the fore-going modifications are illustrated in Fig. 5-1.

PART B

0. INTRODUCTION

Part A of this report details the original modifications defined and incorporated with the Max Cruise modification.

Part B of this report details, in a similar manner the additional changes requested by SNIA to be incorporated together with those original modifications. These modifications to the APFD are covered by DCR 11004 and comprise the following - Mod 1235

0.1. New Glide control law consisting of -

- Glide gain at h_{RA} = 0' to be increased from 0.07 to 0.175
- Glide control to be terminated at 75' instead of 100'
- FTCM rate limit of 0.25g/sec in Land from GS Capture.

0.2. Increased delay of 'On Beam' time delays

These are defined in SNIA telex no. 5 of 4.3.76 and no. 1 of 12.3.76

Mod 1235

0.3. DCR 11005 outlines an improvement in the logic when cancelling Go-Around with a selection of Heading Hold. Telex no. 12 of 9.3.76 refers.

0.4. Roll off capacitor fitted to Output synchronise level switch

0.5. A monitor logic driver for S55 conditions

The Warning & Landing Display computer is affected by the change in threshold of the 100' level switch since several functions utilise this interlock from the APFD (Pitch) computer.

SNIA telex no. 1 of 12.3.76 recommends that the threshold of the existing 100 feet level switch is to be changed to 75 feet and that all functions dependent on this level switch would therefore be switched at 75 feet both in the APFD (pitch) computer and Warning & Landing Display computer. As a result of subsequent telephone conversations with SNIA it was decided that the inhibition of the glide-slope boundary exceed bars and the associated Autoland warning would be inhibited at 100 feet since the certification flying had been performed under these conditions. Details of this modification to the Warning & Landing Display computer can be found in Para 2 of Part B of this note.

Ref. MEA telexes no. 6551 of 5.3.76 and no. 6563 of 29.3.76.

1. APFD - IMPLEMENTATION Mod 1235

1.1. New Glide Control Law (DCR 11004 (a, b, c)) Fig 1-1 refers

The change in gain of the Glide variable gain is achieved by component changes only.

The rate limit change is effected by the generation of a new logic switching function (Land engage) which operates through a diode-or function on the rate limit switch which at present exists for Go-Around.

Mod 1235

1.2. Increased delay on "on Beam" delay (DCR 11004(d))

This is to ensure that a genuine Glide slope capture is enabled only when the conditions for capture (sign sensors in the correct sense and G/S receiver failure warning healthy) have existed for 3 seconds. This ensures that a transient appearance and disappearance of the Glide slope receiver failure warning within 3 seconds cannot enable a false capture. This is achieved by the increasing of the time constant of the 'On Beam' delay to 3 secs - this requires the use of a transistor driver. Fig. 1-2 refers.

1.3. Go-Around logic (Fig 1-5 refers)

It was noted in SNIA telex no. 12 of 9.3.76 that the cancellation of Go-around mode (when previously in Glide mode) frequently resulted in the Pitch axis reverting to Glide mode when Heading Hold was selected.

Investigation showed that when Go-around was selected an inhibit was placed on the Glideslope capture 'A' outputs but that the Glideslope capture 'B' outputs were forced healthy (this was to ensure that selection of Go-around did not result in the encoding of Pitch mode). This meant that when Heading Hold was selected (to terminate Go-around) the conditions for encoding external mode were (transiently) still extant and Glide Capture recurred.

The proposed solution changes the logic in two areas on the Logic Command A module -

- to remove the enabling condition on the Glideslope capture B output when in Go-around (This removes the mechanism which results in Glide mode the end of Go-around).

- to remove the system engagement condition which was used to latch the Glide capture signal (This overcomes the problem of Pitch mode being encoded at the start of Go-around the logic for which was removed in the modification to the logic on the Glideslope capture 'B' output)

The Logic Monitor B module has been modified in accordance with the first part of the logic changes above. The second part of the command logic modification is not necessary in the monitor logic since all mode encoding is achieved in the command logic only.

These modifications ensure that selection of Heading Hold will cancel Go-around (when in Glide or Land mode) and cause Pitch and Heading Hold mode selection.

1.4. Roll off capacitor added to Output synchronise level switch

A 10pF capacitor is added to the amplifier to prevent oscillation.

1.5 S55 (monitor) logic drive

To remove the possibility of a single failure affecting both computing lanes of the computer a monitored version of switch 55 has been incorporated on Logic Monitor B module. Fig. 1.5 refers.

1.6. Computer wiring changes

Fig. 1.6 refers.

2. WARNING & LANDING DISPLAY COMPUTER - IMPLEMENTATION

The introduction of the new 100' level switch is used to inhibit glide slope deviation warnings and the resulting Autoland warning.

The 75' interlock from the APFD (pitch) computer is used to inhibit

- the AP disconnect resulting from a single GS receiver failure
- the Autoland and flashing boundary exceed bars resulting from a GS transmitter failure.

The new 100' level switch is fitted on the Radio logic assembly (monitor) module.

Fig. B-2-1 refers.

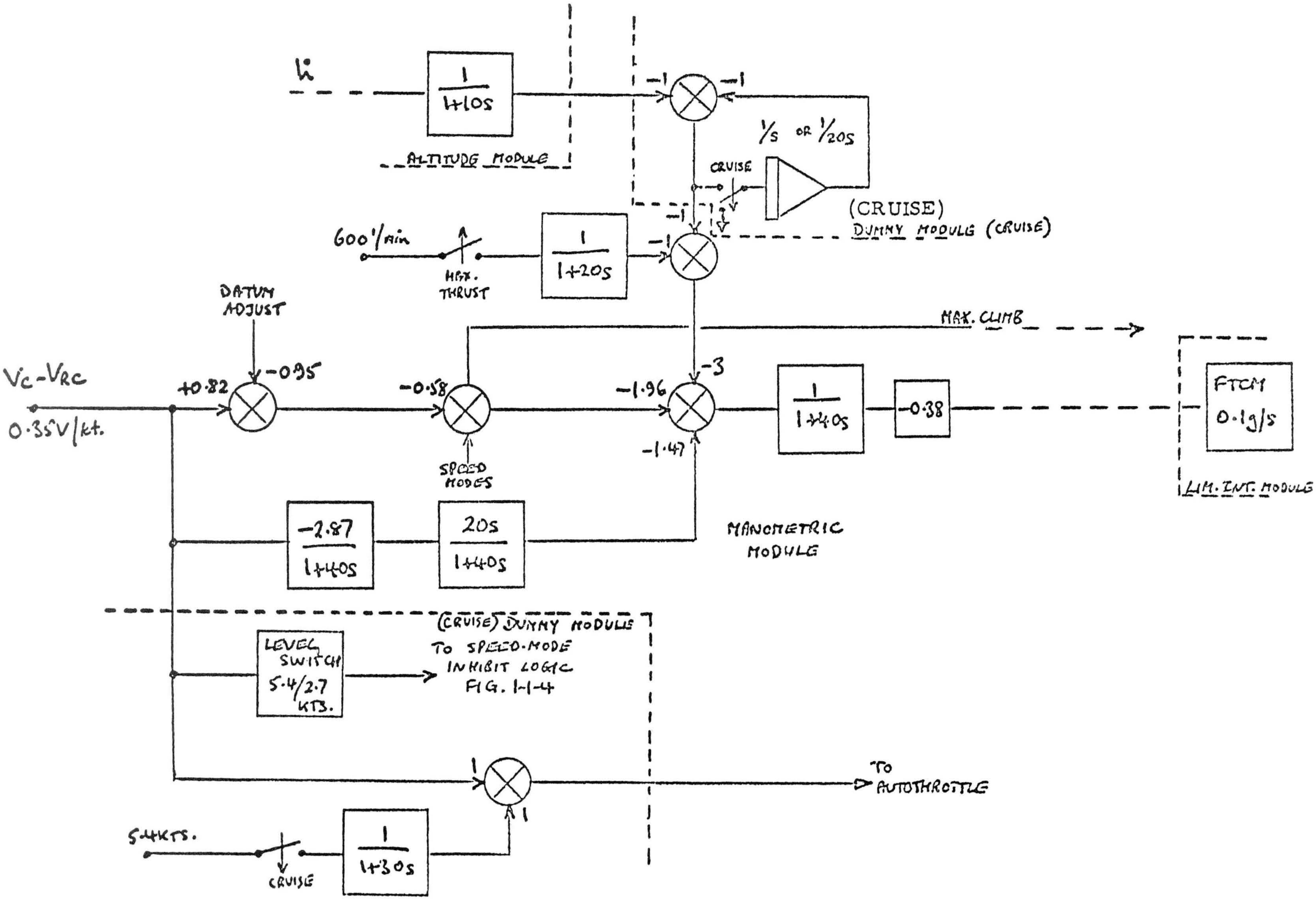
PART C

This part of the report details the incorporation of DCR 10234 into the SFC computer.

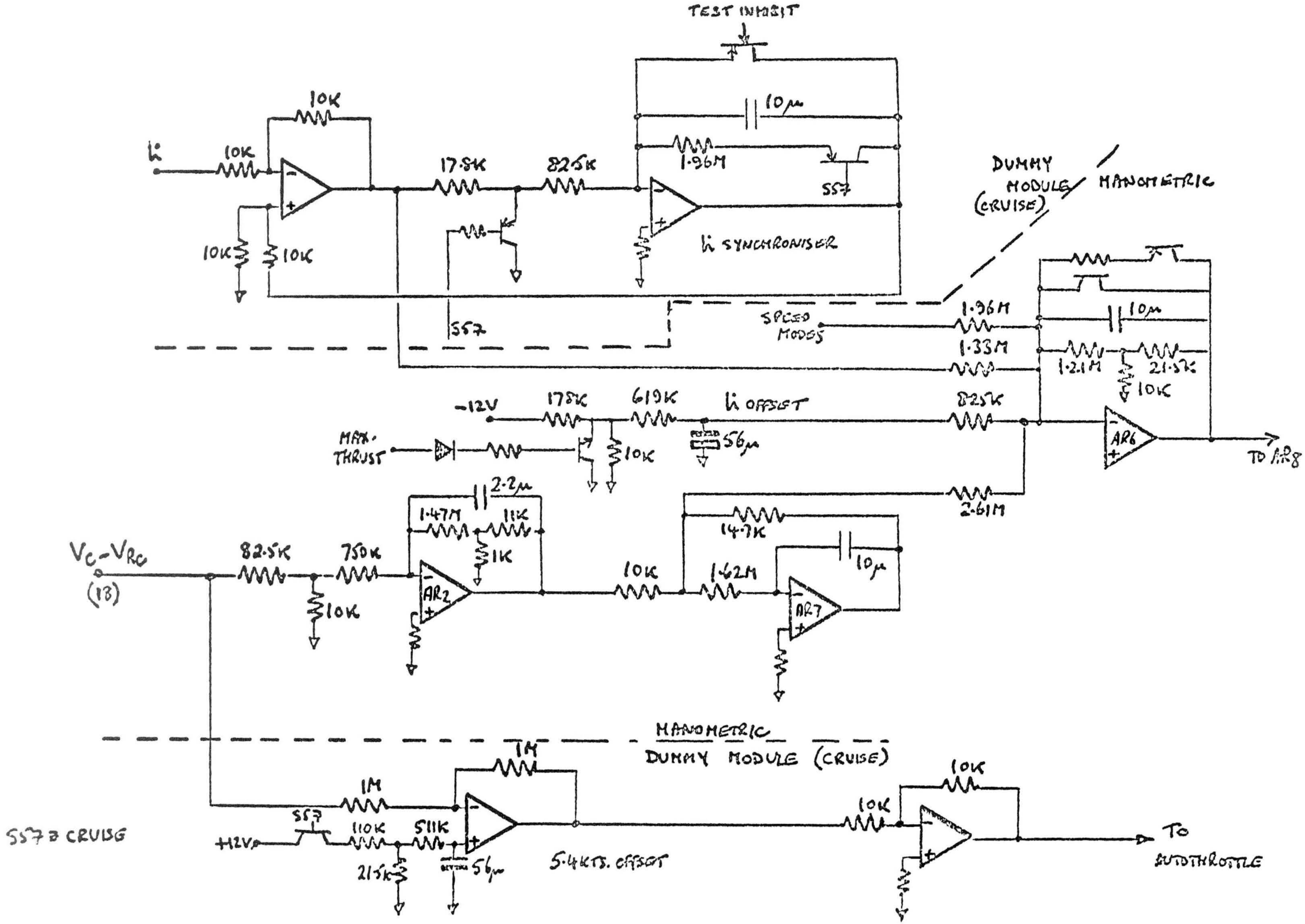
This modification introduces a new inhibit on the conditions for Anti-Stall computing such that the function is enabled at speeds of $V_c < 60$ kts. The facility is therefore inhibited between $V_c > 60$kts and 10 secs after lift-off.

The modification has been implemented on the logic modules.

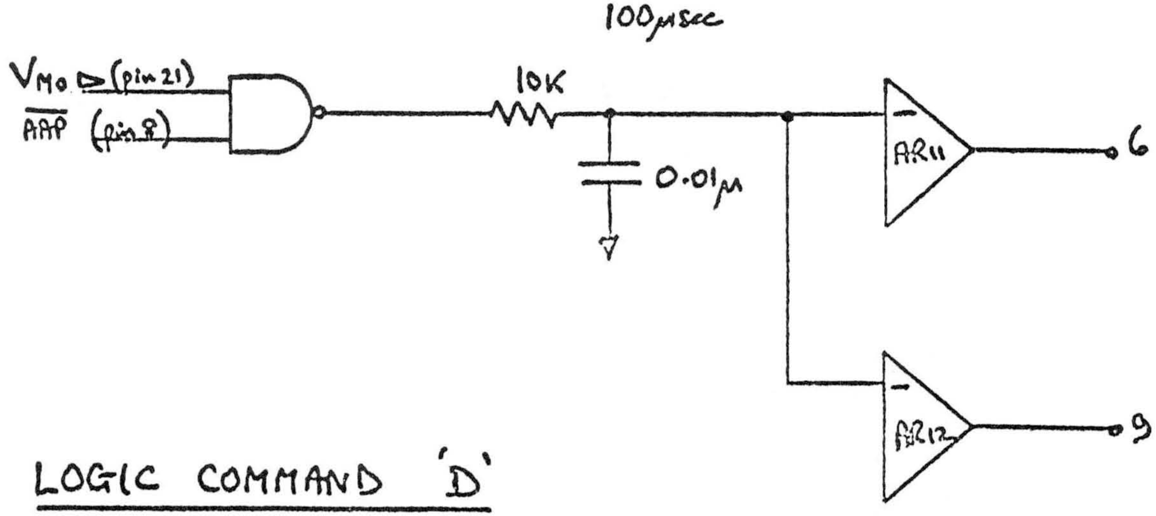
Fig. 1-1 refers.



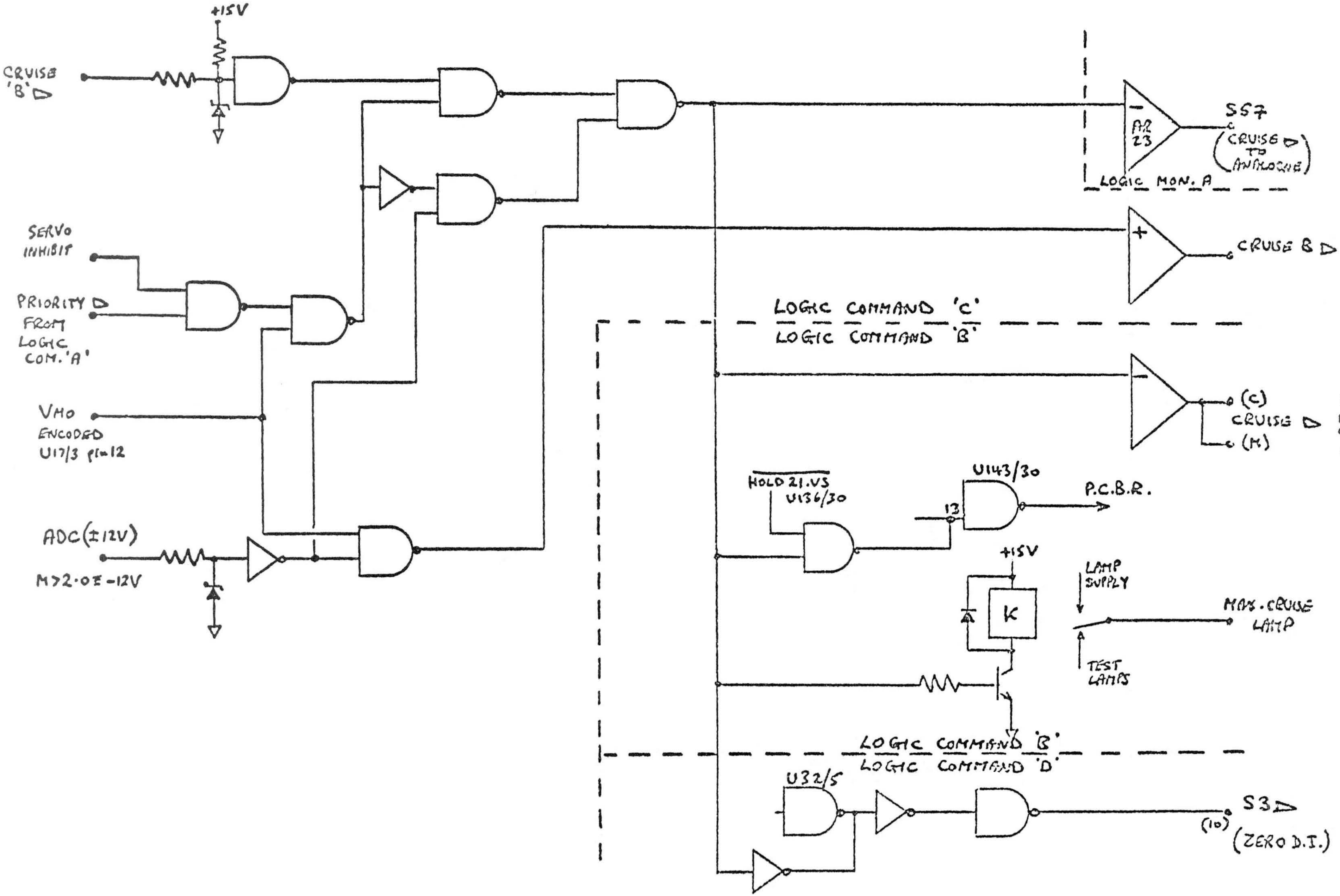
A-FIG 1-1-1(a) MAX. CRUISE ANALOGUE COMPUTING



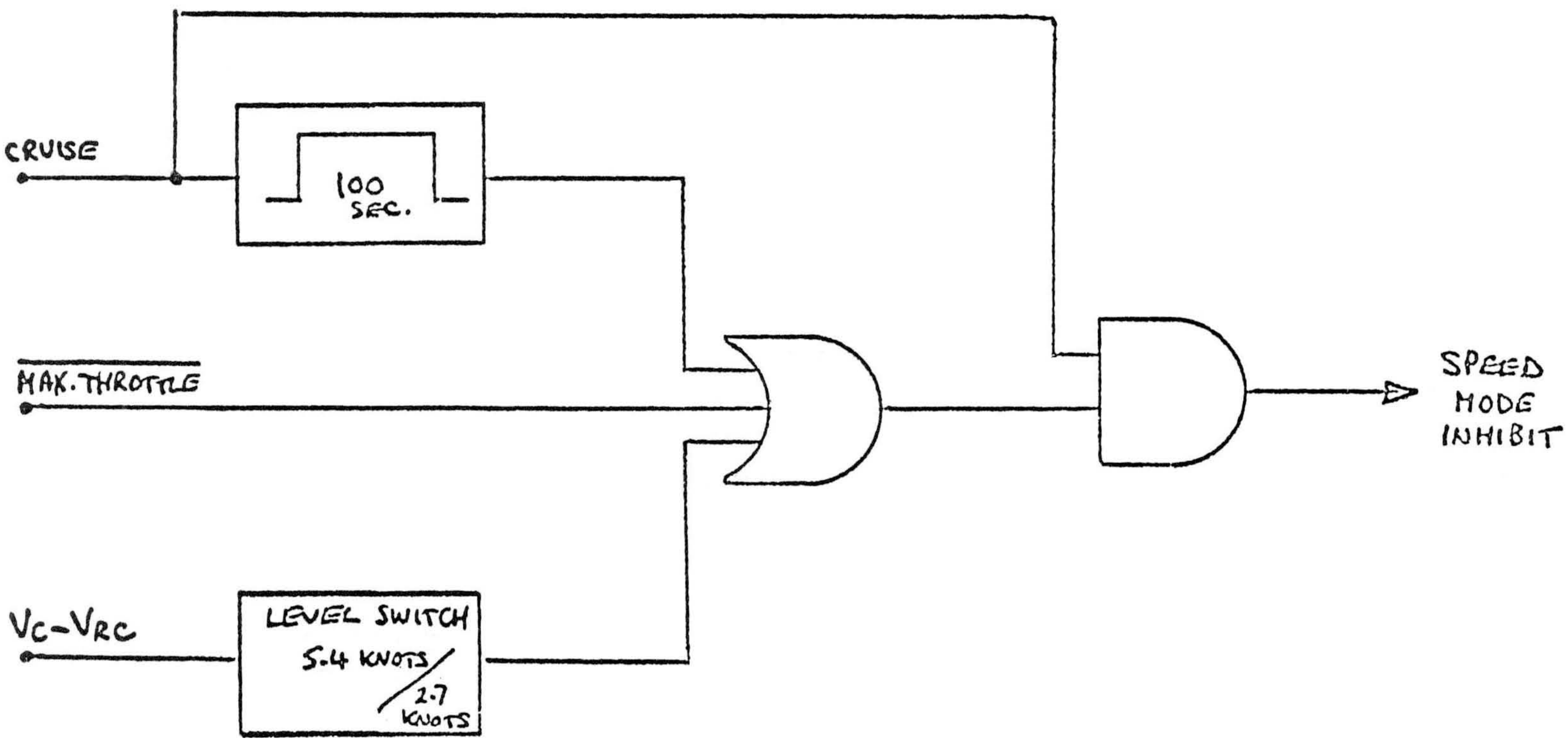
A-FIG 1-1-1(b) MAX. CRUISE – ANALOGUE COMPUTING



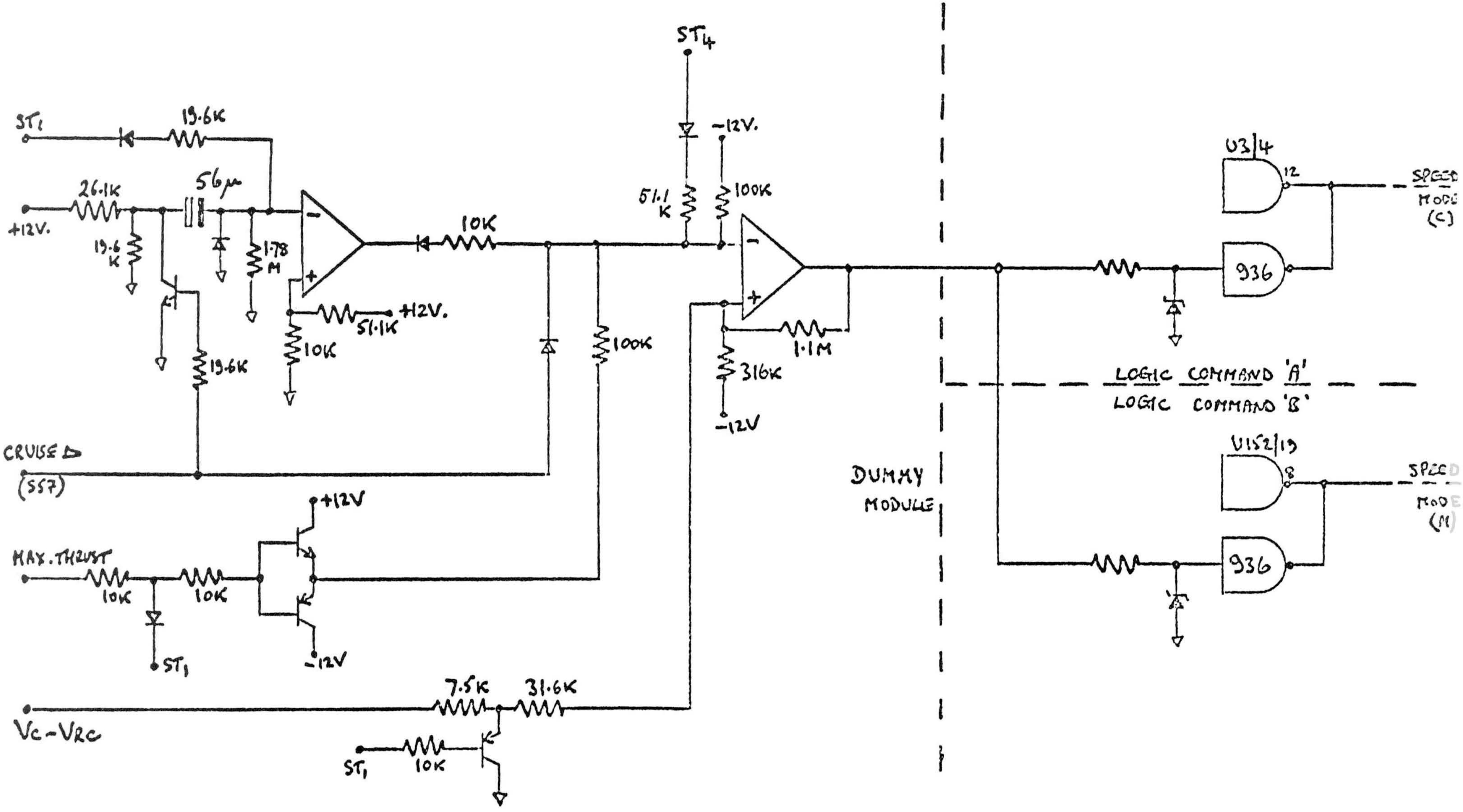
A - FIG. 1-1-2 AAP + VMO OUTPUT



A-FIG 1-1-3 CRUISE LOGIC



A - FIG. 1-1-4 (a) MAX. CRUISE - SPEED MODE INHIBIT



A-FIG 1-1-4(b) SPEED MODE INHIBIT LOGIC

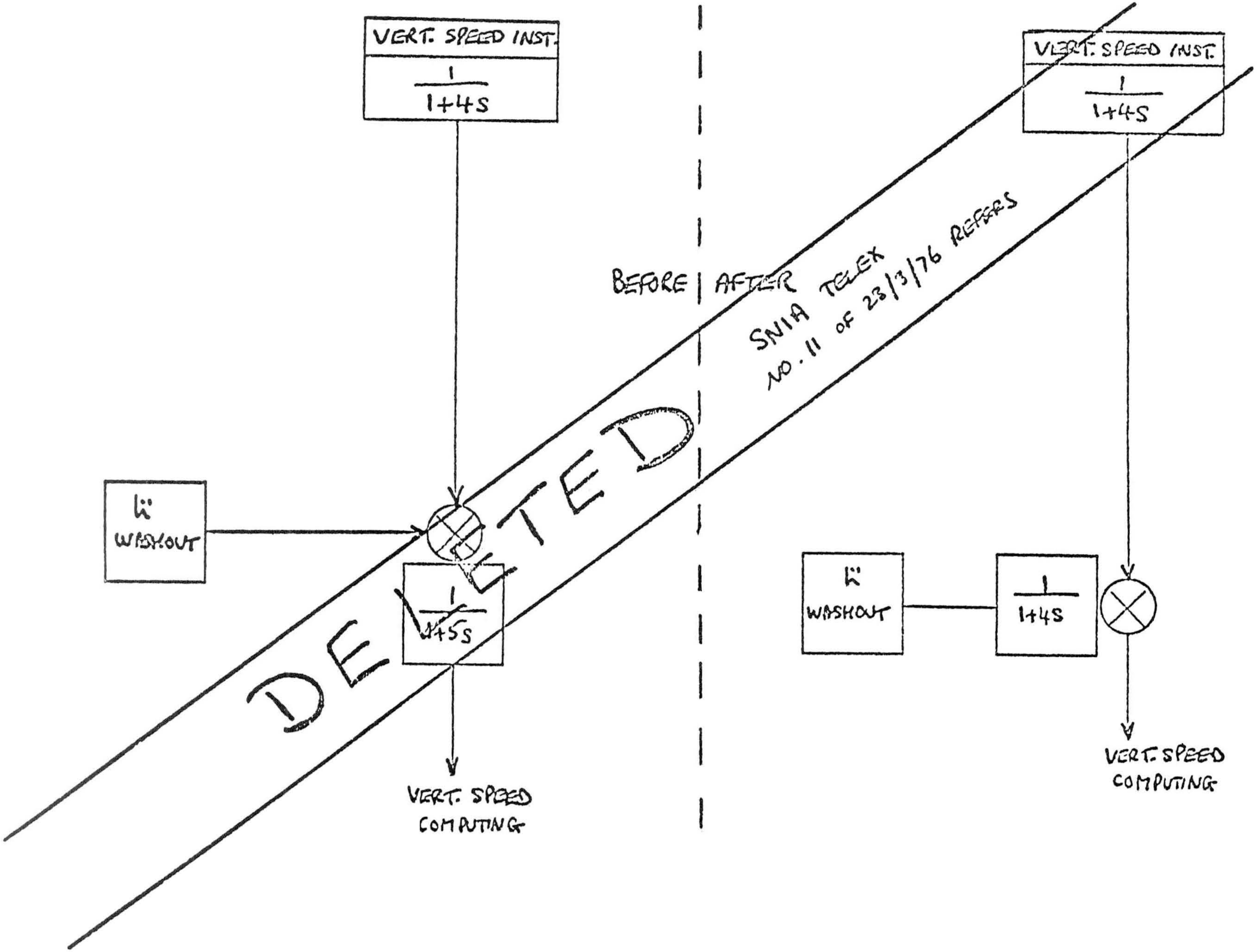


FIG. 1-1-5(a) VERT. SPEED FILTER – SYSTEM (BEFORE & AFTER)

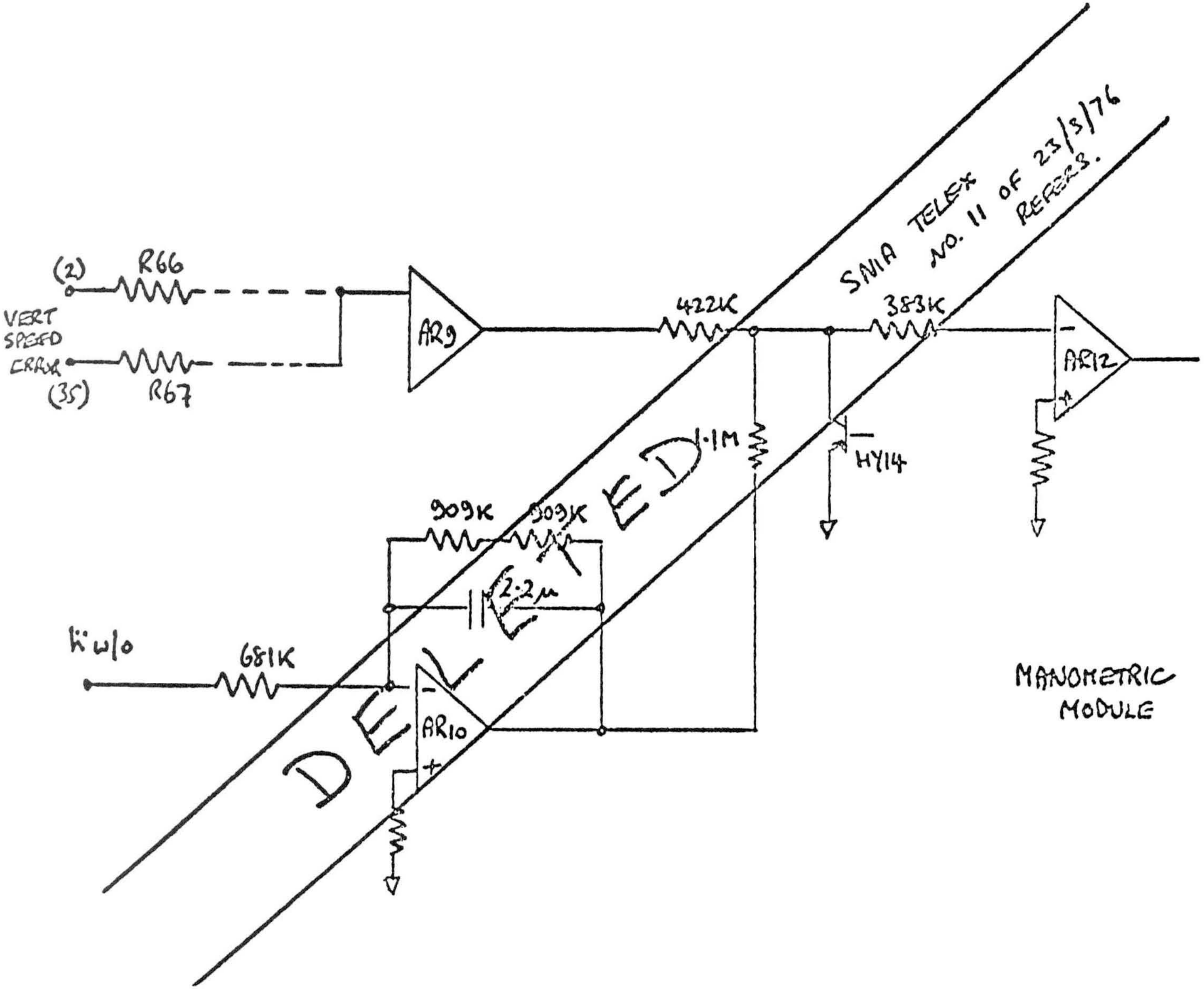


FIG. 1-1-5(b) VERT. SPEED FILTER – CIRCUIT (AFTER MOD.)

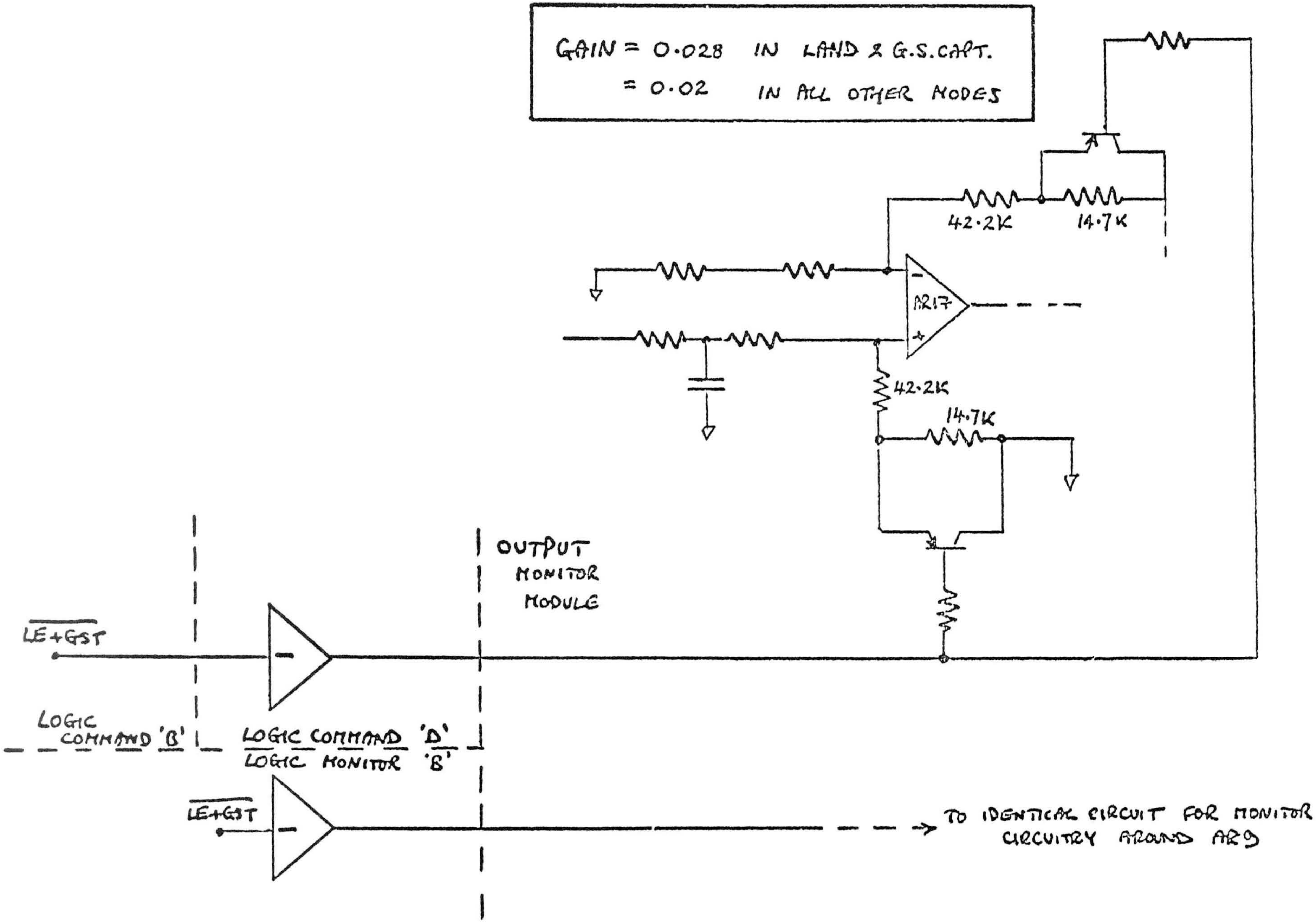
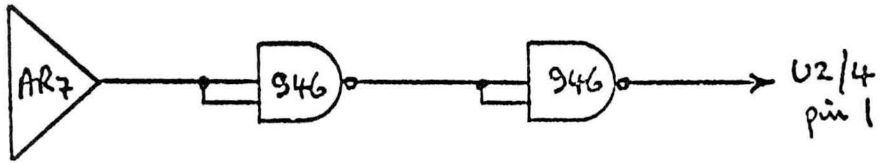


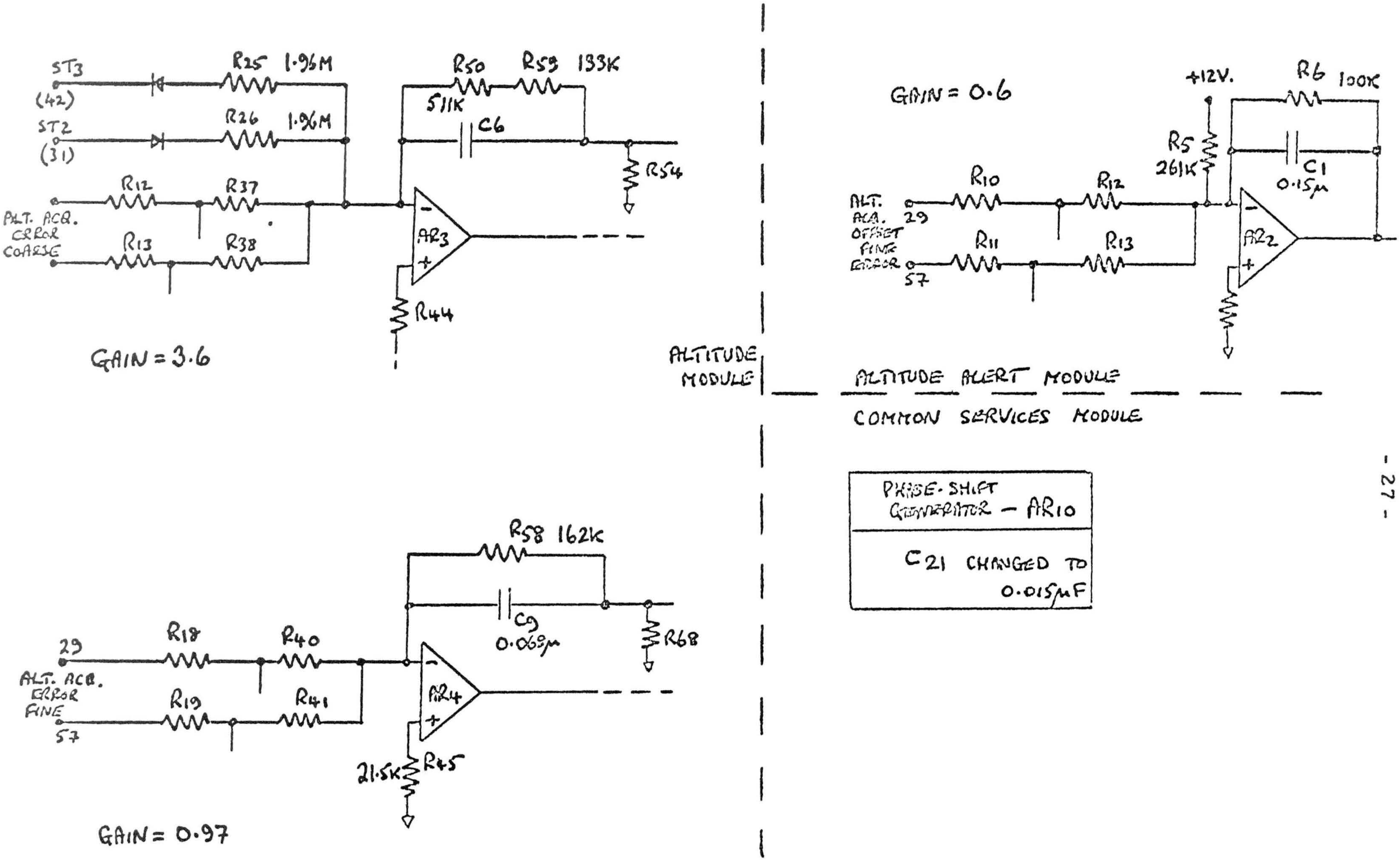
FIG 1-2-1 F.D. GAIN SWITCHING (DCR 10099)



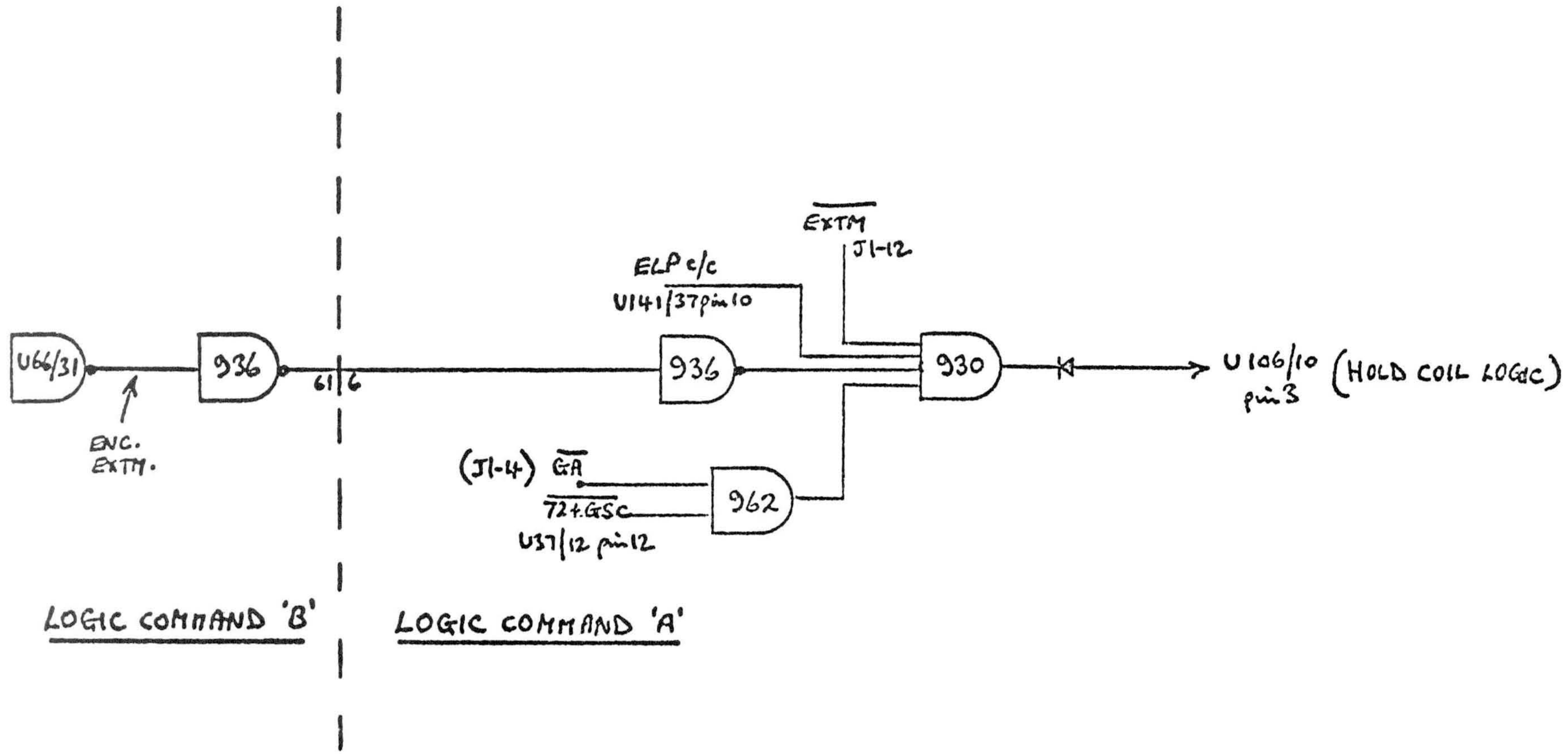
ADD A 0.1μF CAPACITOR BETWEEN Q7 (BASE) AND LOGIC EARTH

ALTITUDE ALERT MODULE

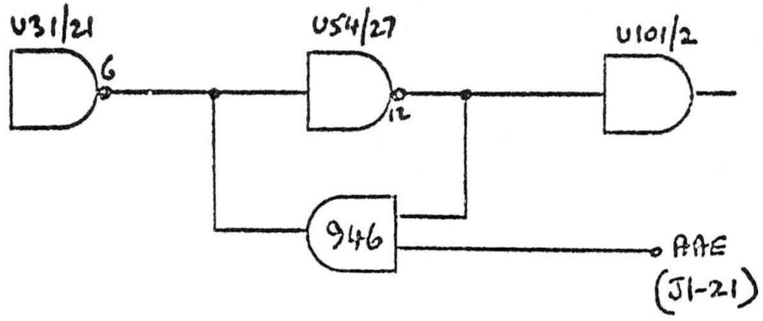
A-FIG.1-3-1 ALTITUDE ALERT FALSE WARNINGS



A FIG 1-3-2 ALTITUDE ACQUIRE SCALING

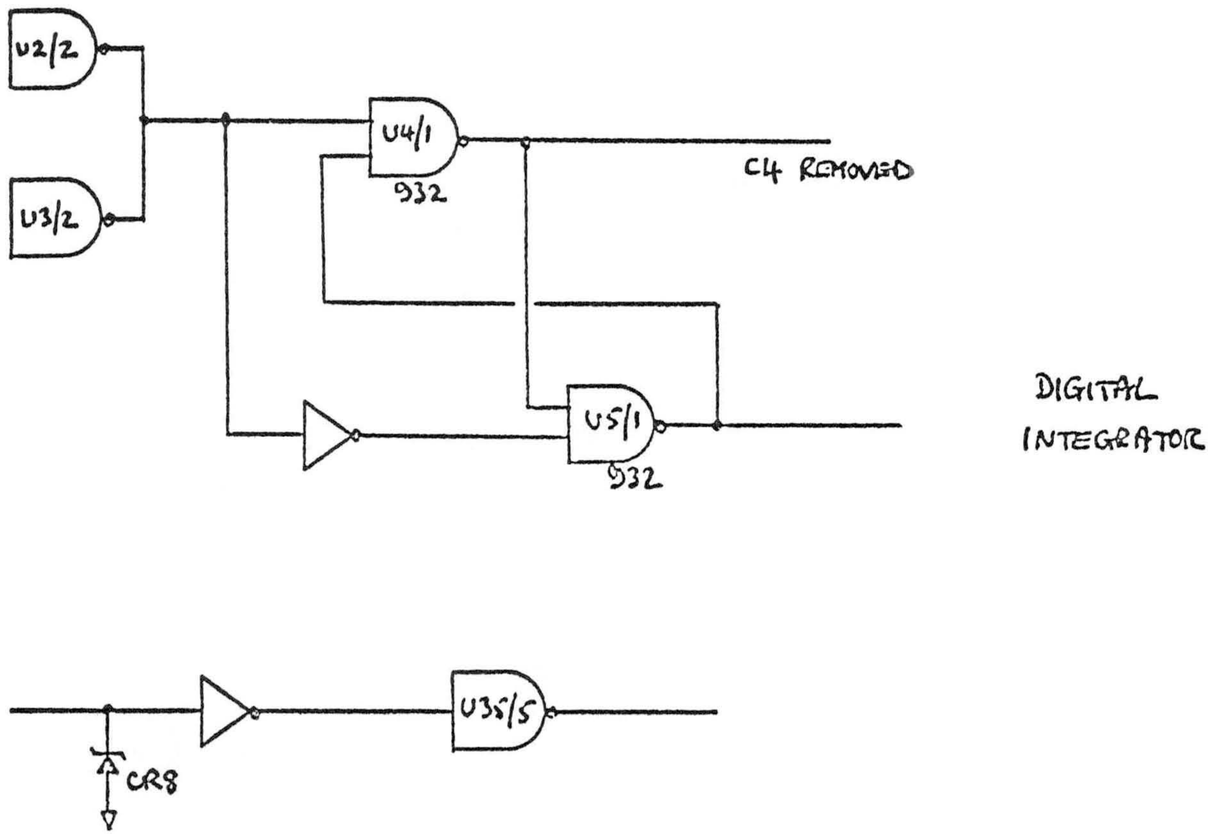


A – FIG. 1-4-1 LOSS OF EXTERNAL MODE LOGIC



LOGIC COMMAND 'B' MODULE

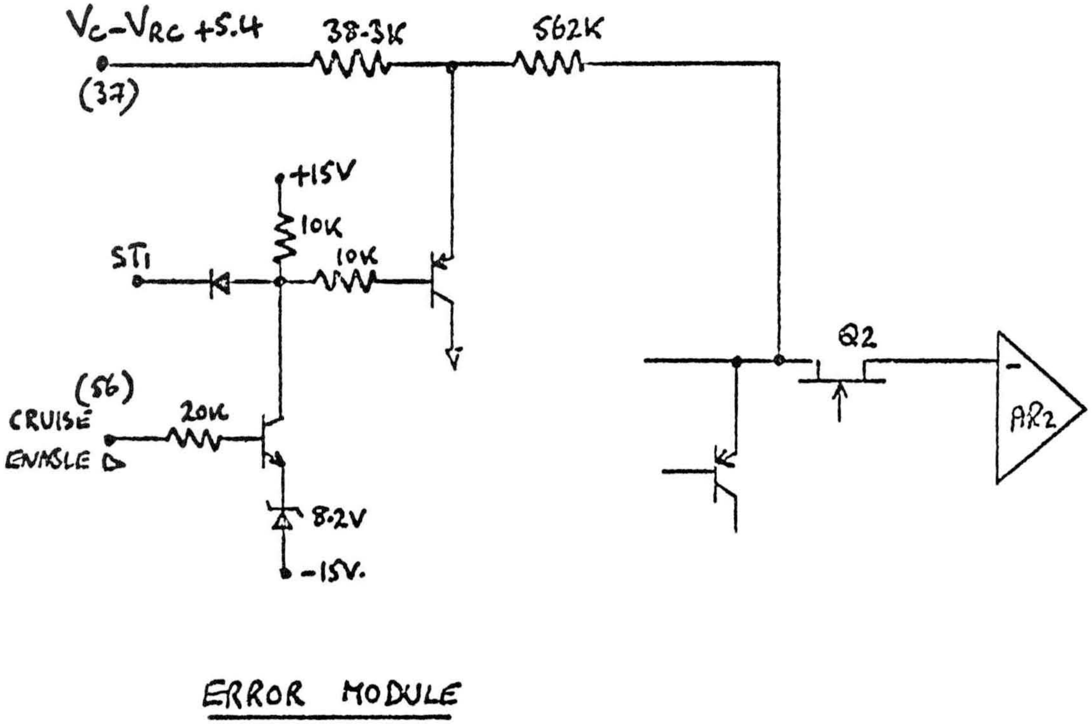
A - FIG. 1-5-1 ALT. ACQUIRE SIGN SENSOR LATCH



A- FIG. 1-6-1 CORRECTION OF D.I. JUMPING

Fig. 1-7-1 NEW COMPUTER WIRING (APFD COMPUTER)

FUNCTION	FROM	TO
Speed Mode inhibit (C)	Dummy -70	Logic Com. A -60
CRUISE (logic level)	Logic Com. C - 43	Logic Com. D -70
Speed Mode inhibit	Dummy -70	Self Test B-70 (Stack pin)
Hold 21.	Logic Com. B- P1-44	Logic Com. C -45
ADC interlock	DPX-BA-19 ✓	Logic Com. C -72
Speed mode inhibit (M)	Dummy -70	Logic Com. B -48
CRUISE (Low level)	Logic Com. C-43	Logic Com. B -40
Max Cruise illuminate	Logic Com. B-12	DPX -AB4 ✓
CRUISE A (M)	Logic Com. B-17	DPX-BB101 ✓
CRUISE B	DPX-AA72 ✓	Logic Com. C -66
Vc- VRC lagged	Manometric -14	Test connector - ZB
CRUISE A (C)	Logic Com. B -8	DPX-BA101 ✓
CRUISE B	Logic Com. C -15	DPX-AA60 ✓
S57 (C)	Logic Mon. A-25	Manometric -3
S57 (M)	Logic Mon. A-25	Dummy -41
Max thrust	DPX-BB76 ✓	Manometric -77
ST1	Self Test B -115	Dummy (Stack Pin)
ḣ synch.	Dummy -10	Test connector - ZA
ST4	Self Test B- 73	Dummy (Stack Pin)
Vc - VRC	DPX-BA90 — from ADC	Dummy -27
Max thrust	DPX- BB76 ✓	Dummy -13
C. F. ḣ	Altitude - 1	Dummy -43
Speed mode inhibit	Dummy -70	Test Connector - ZB
w/o inhibit	Dummy -93	Test Connector - ZB
ḣ synch.	Dummy -10	Manometric -45
Vc - VRC +5.4 (C)	Dummy -33	DPX- BA99 ✓
Vc - VRC +5.4 (M)	Dummy -31	DPX-BB99 ✓
$\overline{LE + GST}$	Logic Com. B - 4	Logic Com. D -66
S59 (C)	Logic Com. D -69	Output (M) -91
S59 (M)	Logic Mon. B -20	Output (M) -124
Enc. EXTM.	Logic Com B-J1-61	Logic Com A-J1-6
CRUISE (low level)	Logic Com C -43	Logic Mon A-13
Servo Inhibit c/c	Logic Com A -28	Logic Com C-13



ANALOGUE GAIN = 1.67

A - FIG. 2-1 AUTOTHROTTLE MAX. CRUISE ANALOGUE COMPUTING

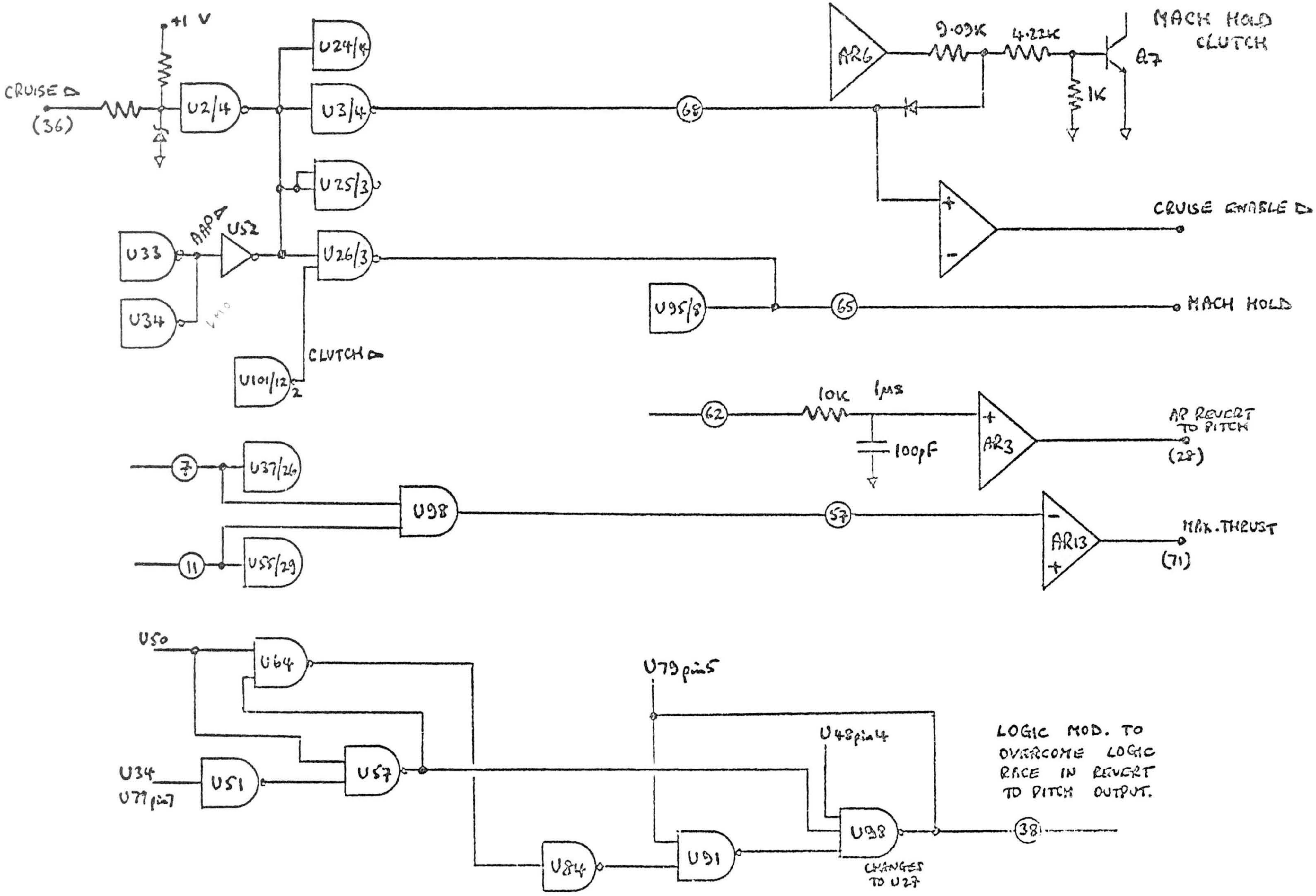
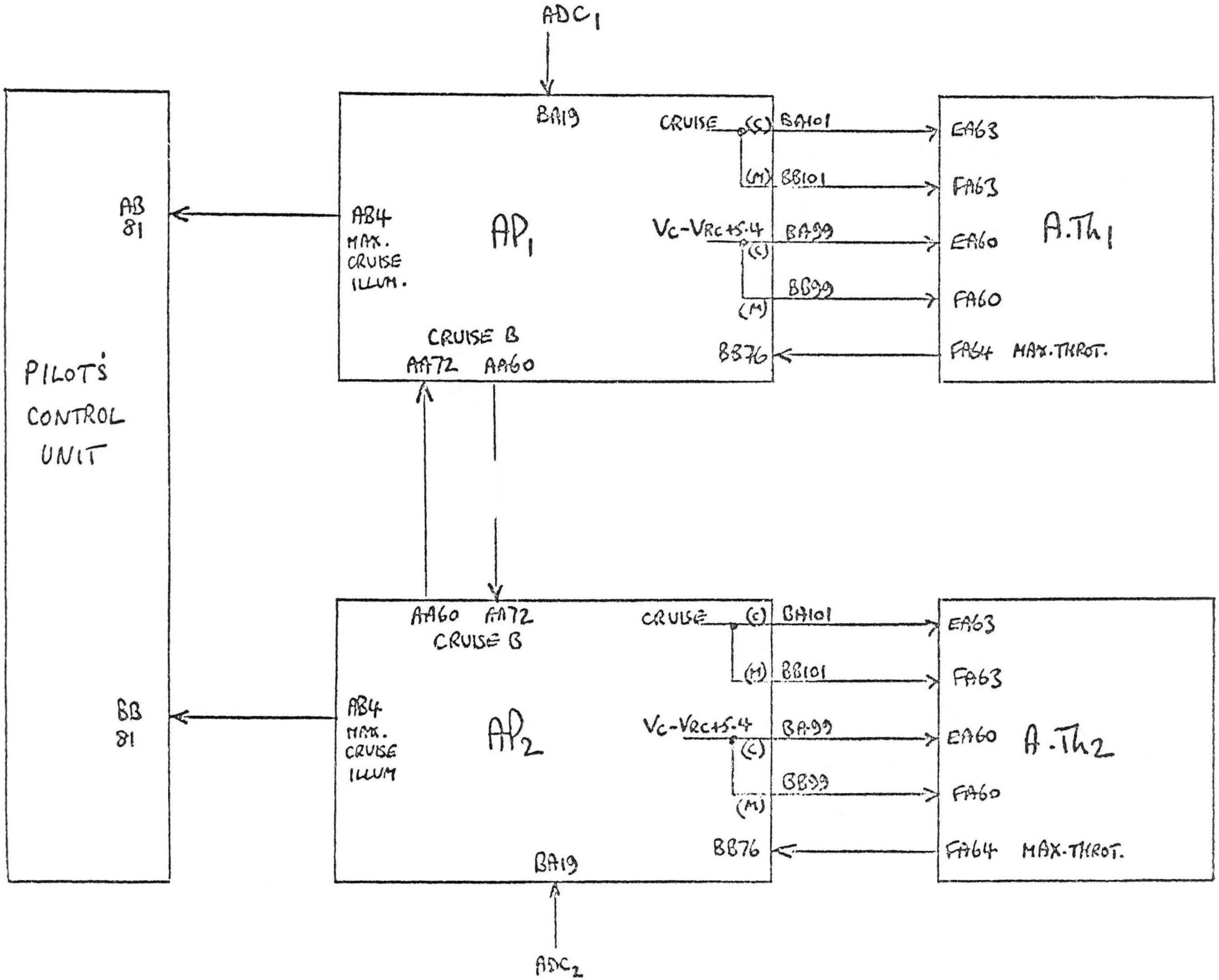


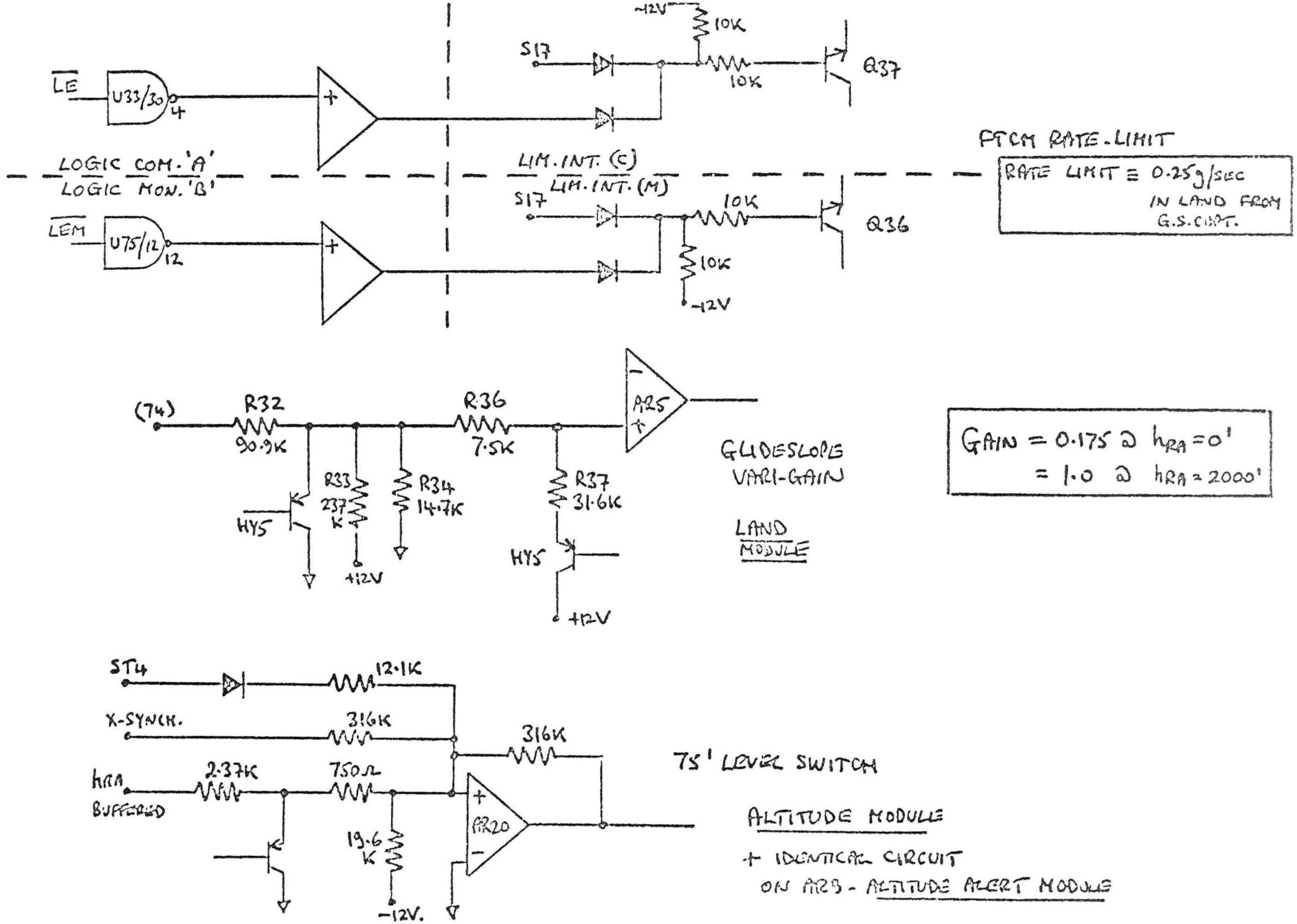
FIG 2-2 MAX CRUISE LOGIC (AUTOTHROTTLE)

Fig. 2. 3. NEW COMPUTER WIRING (AUTOTHROTTLE)

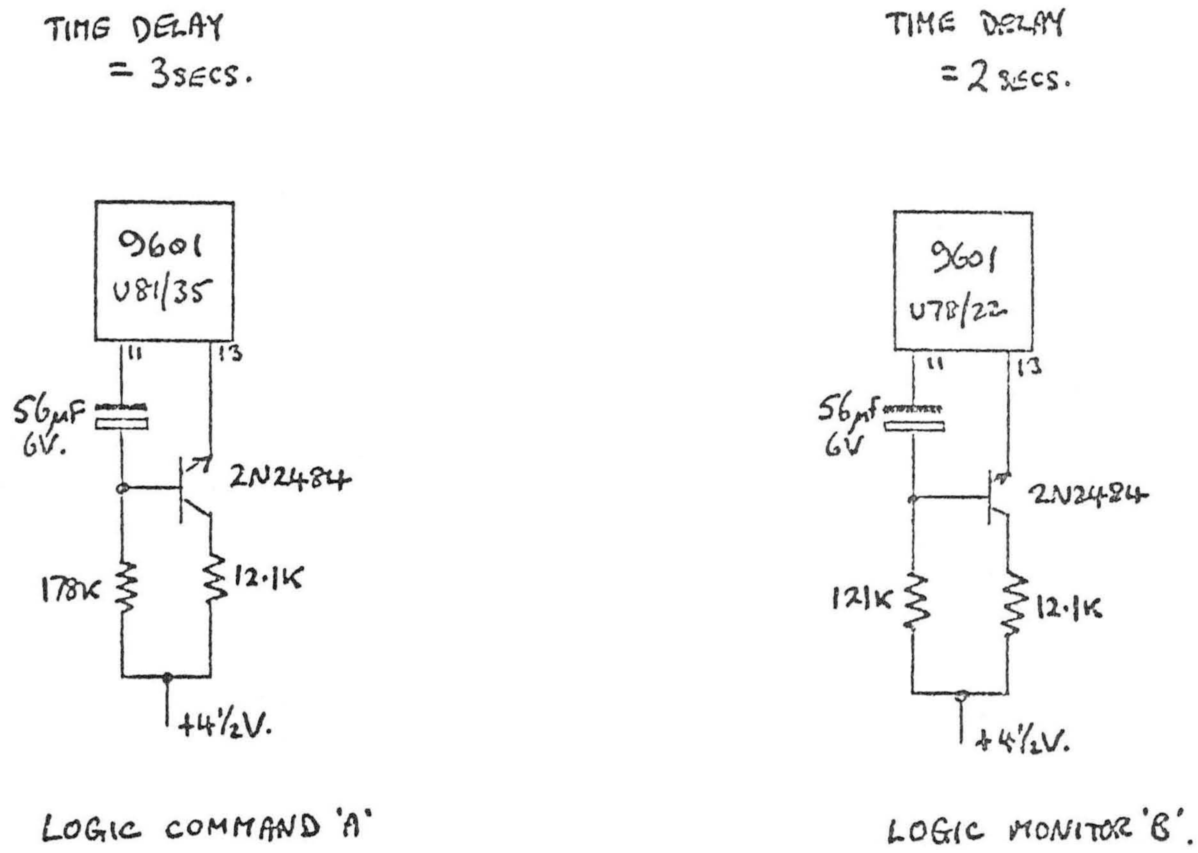
FUNCTION	FROM	TO
CRUISE ▷(C)	DPX (EA63) ✓	Logic (C) -36
Max Thrust (C)	Logic (C) -71	DPX (FA64) ✓
Vc - VRC (C)	DPX (EA60) ✓	Error (C) -37
CRUISE Enable (C)	Logic Pl -50	Error (C) -56
CRUISE ▷(M)	DPX (FA63) ✓	Logic (M) 36
Vc - VRC (M)	DPX (FA60) ✓	Error (M) -37
CRUISE Enable (M)	Logic Pl -50	Error (M) -56



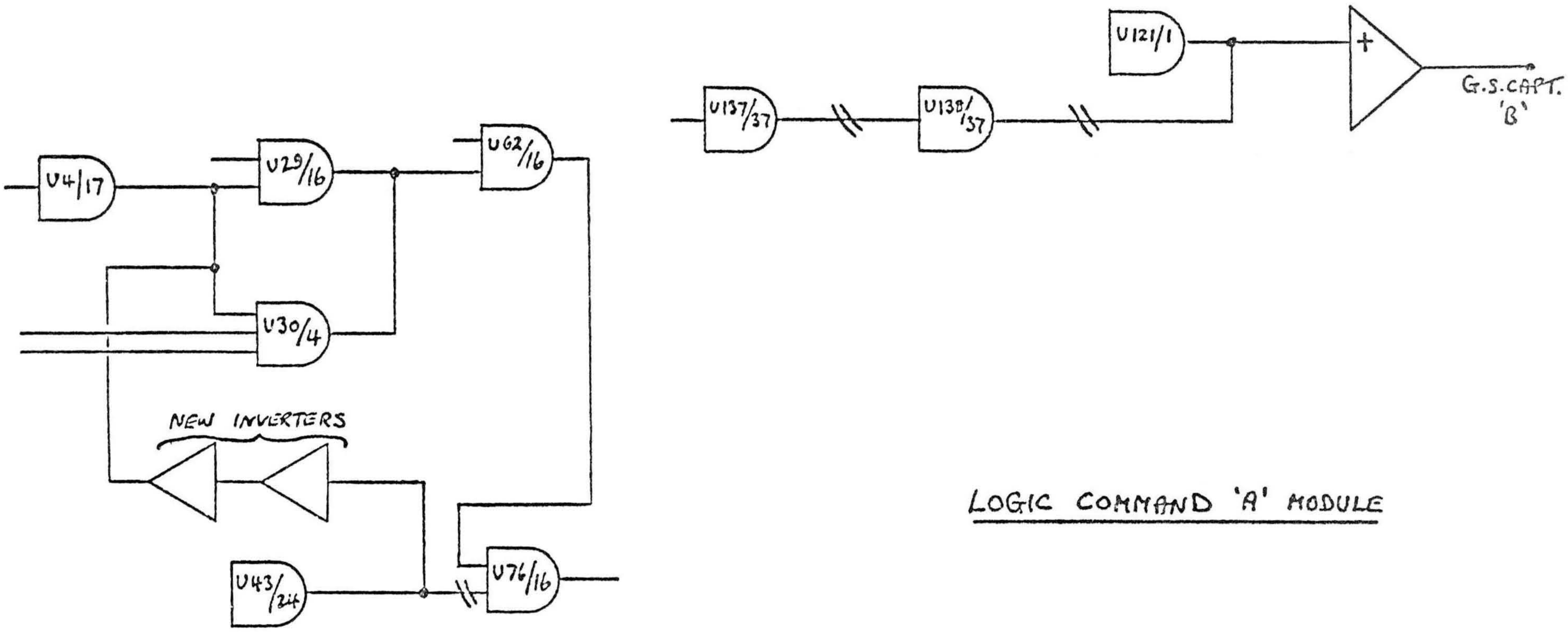
A - FIG 5-1 AFCS WIRING



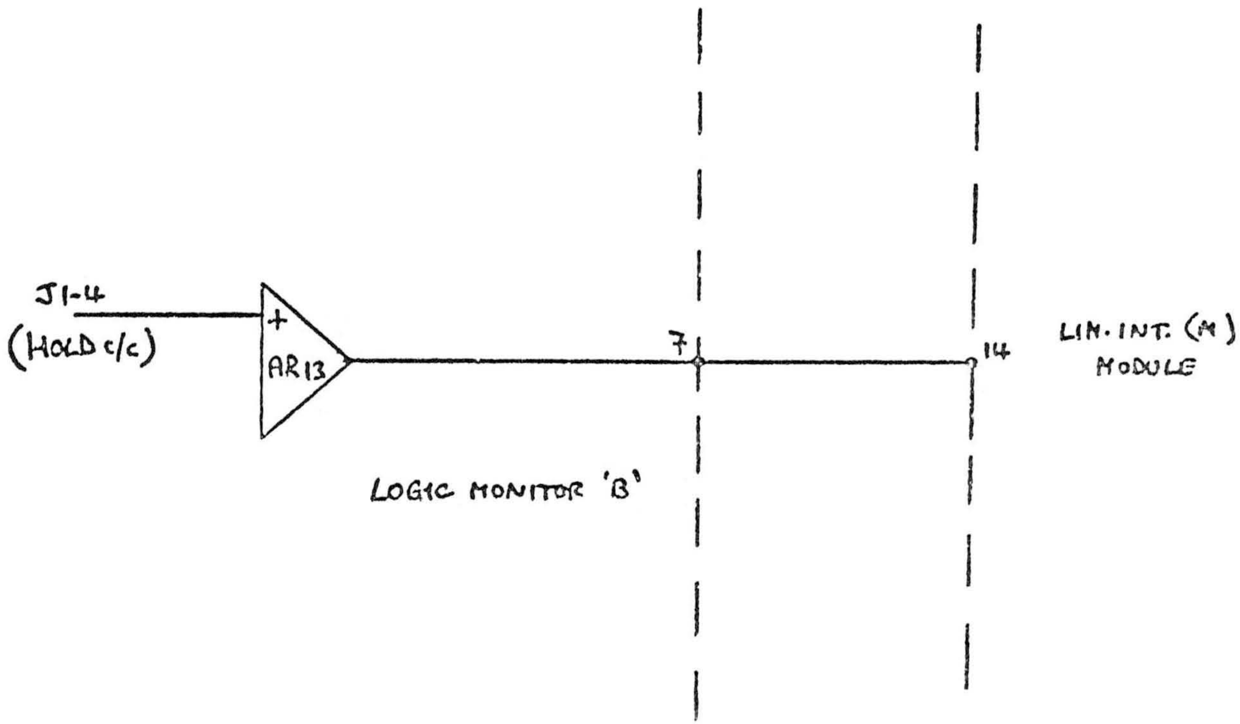
B-FIG 1-1 NEW GLIDE CONTROL LAW



B-FIG 1-2 'ON BEAM' DELAY



B-FIG.1-3 GO-AROUND LOGIC



B- FIG. 1-5 SWITCH 55 (M) DRIVER

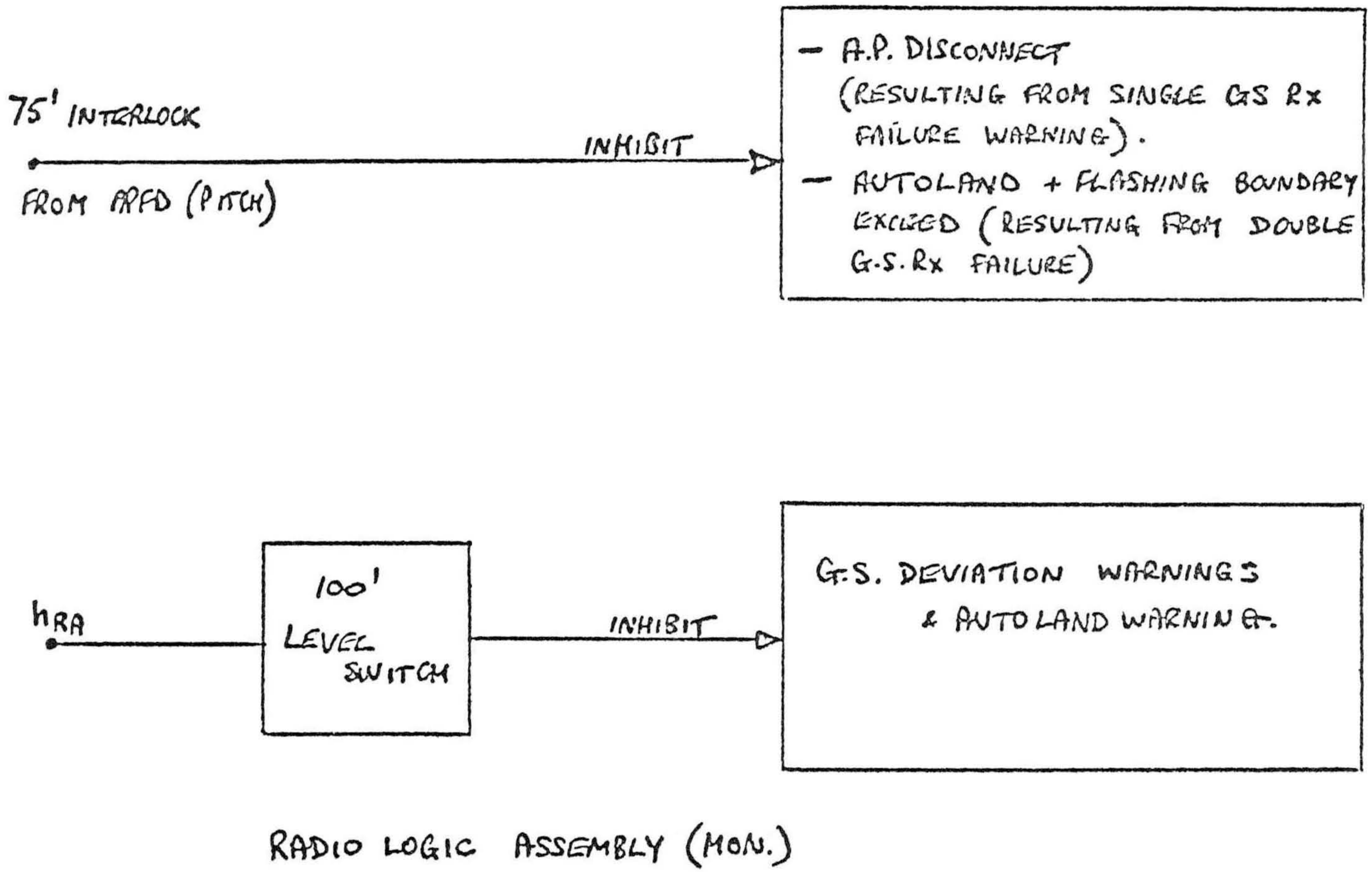
B. Fig. 1-6 NEW COMPUTER WIRING (APFD COMPUTER)

FUNCTION	FROM	TO
S60 (C)	Logic Com. A-1	Lim. Int. (C)-46
S60 (M)	Logic Mon. B-42	Lim. Int. (M)-7
S55 (M)	Logic Mon. B-7	Lim. Int. (M)-14
		Alt. Alert -14

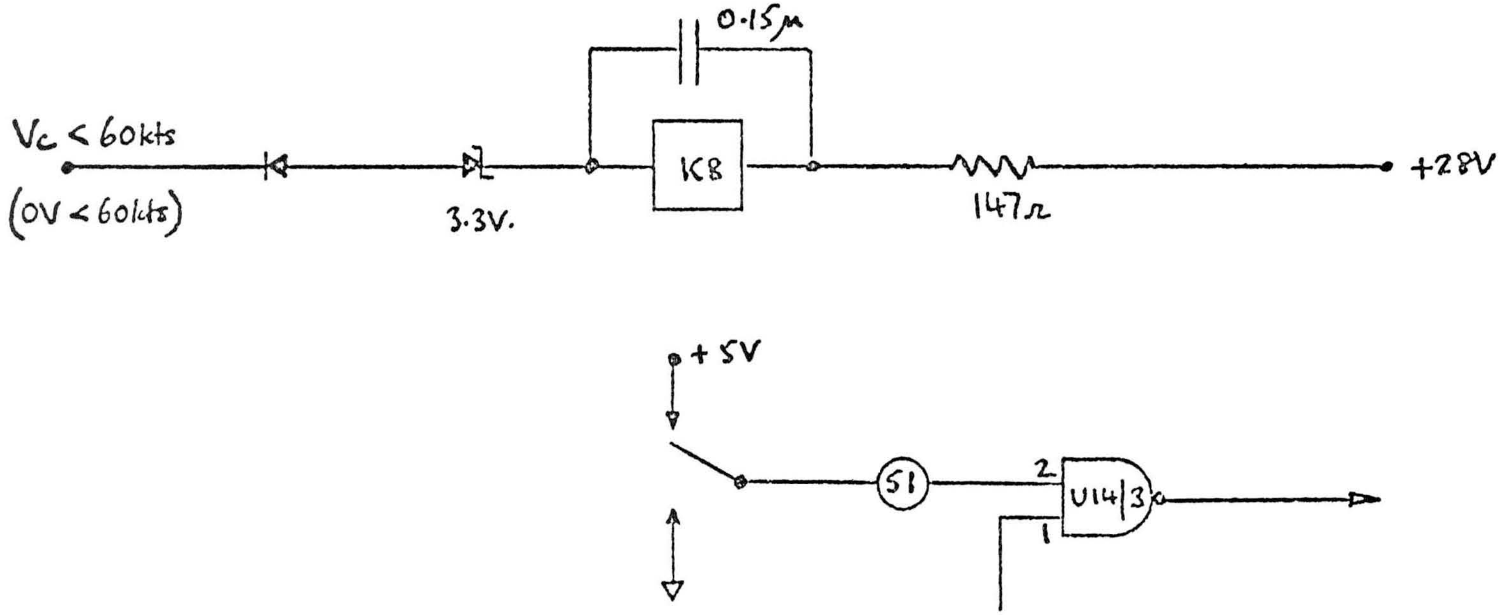
(Delete connection between Logic Com D-64 and Lim. Int. (M)-14 and Alt. Alert-14)

$+4\frac{1}{2}$V	Logic Com A-J1-27	Logic Com B J1-7

(Delete connection between Logic Com A-1 and Logic Com B-79)



B-FIG. 2-1 GLIDESLOPE & AUTOLAND WARNING INHIBITS



LOGIC-ELECTRONIC ASSEMBLY.

COMPUTER WIRING

ADD THE FOLLOWING 2 NEW WIRES —

AA87 — LOGIC COM. 31-J1-

AB87 — LOGIC MON. 11-J1-

C-FIG. 1-1 SFC ANTI-STALL INHIBIT Vc > 60 kts