

SATURN / APOLLO

launch operations

test procedure

TELEMETRY CHECKOUT EQUIPMENT

TEST AND CALIBRATION

3-CIGSEIB-202

FLORIDA OPERATIONS



CHRYSLER
CORPORATION

LAUNCH OPERATIONS TEST

1. TITLE: <div style="text-align: center; margin-top: 20px;">TELEMETRY CHECKOUT EQUIPMENT TEST AND CALIBRATION</div>		2. TEST NUMBER <div style="text-align: center;">3-CLGSEIB-202</div>
4. OBJECTIVES: TO INSURE THAT THE TELEMETRY CHECKOUT EQUIPMENT WILL RECEIVE THE TELEMETRY DATA FROM THE VEHICLE AND DISPLAY AND RECORD THIS DATA WITHIN KNOWN ACCURACY SPECIFICATIONS.		3. <div style="text-align: center;">SATURN IB</div>
5. TEST DESCRIPTION: THE PROCEDURE PERFORMS TWO MAJOR FUNCTIONS. THE FIRST CHECKS THE EQUIPMENT FOR PROPER OPERATION. THE SECOND CHECKS FOR CORRECT RECEPTION OF THE TELEMETERED DATA AND FOR THE CORRECT DISPLAYING AND RECORDING OF THIS DATA. THIS PROCEDURE IS SUB-DIVIDED INTO SIX MAJOR PARTS WHICH CALIBRATE THE ENTIRE TELEMETRY CHECKOUT EQUIPMENT FOR SUPPORT OF ANY VEHICLE TEST.		
6. STATUS: <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> TEST CONDITIONS: SETUP CONDITIONS: </div> <div style="width: 70%;"> PRIOR TO VEHICLE INITIAL CHECKOUT. 1. ONE-HALF HOUR WARMUP OF TELEMETRY CHECKOUT EQUIPMENT. 2. PART 1 MUST BE PERFORMED FIRST. 3. AFTER COMPLETION OF PART 1, ANY ONE OR ALL OF THE TESTS IN THE REMAINING PARTS CAN BE COMPLETED IN THE MOST CONVENIENT ORDER. </div> </div>		
7. PREPARED BY: <div style="display: flex; align-items: center;"> <div style="flex: 1;"> T. MUNDAY <i>T. Munday</i> </div> <div style="flex: 1;"> <i>LC Blanchard</i> </div> </div>	9. NASA SYSTEMS ENGINEER <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <i>J. W. Broadbent</i> </div> <div style="flex: 1;"> <i>W. R. Dietz</i> </div> </div>	11. DATE <div style="text-align: center;">7-15-65</div>
8. CONTRACTOR GROUP ENGINEER <div style="text-align: center;"><i>J. W. Broadbent</i></div>	10. NASA SYSTEMS SUPERVISOR <div style="text-align: center;"><i>W. R. Dietz</i></div>	12. CONTRACTOR REFERENCE NR. <div style="text-align: center;">3-2</div>

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A. GENERAL REQUIREMENTS.

1. RF SIGNAL GENERATOR, DEVIATION METER, RF SPECTRUM DISPLAY UNIT, AND 30 MHZ AMPLIFIER,
2. FM SYSTEM TEST OSCILLATOR (DCS)
3. TELEMETRY INDICATOR
4. DATA INSERTION SCOS

B. FM/FM RECEIVING EQUIPMENT

1. PAM MONITOR (FM/FM EQUIPMENT ONLY)
2. PAM SIMULATOR
3. PAM SYNCHRONIZER (FM/FM EQUIPMENT ONLY)
4. PAM DECOMMUTATOR
5. DISCRIMINATORS
6. RECEIVERS (FM/FM LINKS ONLY)
7. FM/FM PATCHING

C. SS/FM RECEIVING EQUIPMENT

1. SSB DEMULTIPLEXER AND CALIBRATOR
2. RECEIVERS (SSB OR PCM LINKS)
3. 450 KHZ DEMODULATORS
4. SS/FM PATCHING

D. TRS-1 RECEIVING EQUIPMENT

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D. TRS-1 RECEIVING EQUIPMENT

1. PCM SIMULATOR AND 600 KHZ DEMODULATOR
2. TRS-1 SYNCHRONIZER FUNCTIONAL TEST
3. SYNCHRONIZER BIT RATE CHECK
4. FRAME AND MASTER FRAME THRESHOLD TEST
5. DECOMMUTATOR AND DECODING ACCURACY CHECK,
6. RECEIVERS (PCM LINKS)
7. PCM/FM PATCHING

E. COMMON EQUIPMENT

1. TAPE RECORDER CHECK
2. HONEYWELL 1612 VISICORDER TEST.
3. CIF INTERFACE
4. ANTENNA POSITION CONTROL TEST

F. TELEMETRY MONITOR STATION

1. TELEMETRY INDICATOR (MONITOR STATION)
2. PAM MONITOR (MONITOR STATION)
3. PAM SYNCHRONIZER (MONITOR STATION)
4. DISCRIMINATORS
5. RECEIVERS
6. MONITOR STATION PATCHING

LIST OF FIGURES

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F. TELEMETRY MONITOR STATION

FIG. 1. RF GENERATOR, DEVIATION METER SPECTRUM DISPLAY UNIT,
AND 30 MHZ AMPS,

FIG. 2. DATA INSERTION SCO'S,

FIG. 3. PAM SYNCHRONIZER AND DECOMMUTATOR,

FIG. 4. RECEIVERS

FIG. 5. SSB DEMULTIPLEXER AND CALIBRATOR

FIG. 6. 450 KHZ DEMODULATORS

FIG. 7. TAPE RECORDER

A. GENERAL REQUIREMENTS

1. RF SIGNAL GENERATOR, DEVIATION METER, RF SPECTRUM DISPLAY UNIT AND THE 30 MHZ AMPLIFIER.

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) CONNECT THE RF OUTPUT OF THE RF SIGNAL GENERATOR UNDER TEST TO THE INPUT OF A RECEIVER.
- (2) CONNECT THE OUTPUT OF A WIDE RANGE OSCILLATOR TO A FREQUENCY COUNTER AND TO THE EXTERNAL MODULATION INPUT ON THE RF SIGNAL GENERATOR.
- (3) SET THE FREQUENCY OF THE RF GENERATOR TO THE FREQUENCY OF THE SELECTED RECEIVER.
- (4) SET THE OUTPUT LEVEL OF THE GENERATOR TO 5K MICRO VOLTS.
- (5) SELECT THE RECEIVER USED IN (1) ON THE IF TEST SELECTOR PANEL. THE STATION PATCHING SHOULD NOW CONFORM TO FIG. 1.

(B) PERFORM THE FOLLOWING OPERATION STEPS:

- (1) TUNE THE RECEIVER TO THE GENERATOR AND CONFIRM THE PRESENCE OF A SIGNAL. -----
- (2) ADJUST THE GAIN OF THE 30 MHZ AMP UNTIL A STEADY COUNT OF APPROXIMATELY 30 MHZ APPEARS ON THE COUNTER. -----
- (3) NOTE THE PRESENCE OF THE CARRIERS ON ALL DISPLAY UNITS AFTER PROPER ADJUSTMENT. -----
- (4) ADJUST THE WIDE RANGE OSCILLATOR TO A FREQUENCY OF 62.375 +/- 60 HZ. -----
- (5) WHILE WATCHING THE CARRIER ON THE PAN-ADAPTER SLOWLY INCREASE THE DEVIATION OF THE SIGNAL GENERATOR UNTIL THE AMPLITUDE OF THE CARRIER FIRST DIPS TO ZERO. -----

A. GENERAL REQUIREMENTS

- (6) READ THE DEVIATION AS SHOWN ON THE GENERATOR AND THE DEVIATION METER. THIS VALUE SHOULD BE 150 KHZ ± 3 KHZ.
- (7) REPEAT (4), (5), AND (6) SETTING THE OSCILLATOR FOR 31,187 ± 30 HZ. THE DEVIATION METER SHOULD INDICATE 75 KHZ ± 1.5 KHZ.
- (8) RETURN ALL STATION PATCHING TO ORIGINAL CONFIGURATION.

2. FM SYSTEM TEST OSCILLATOR (DCS)

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) CONNECT THE OUTPUT OF THE DCS REFERENCE OSCILLATOR TO THE RF GENERATOR.
- (2) SET THE FM DEVIATION CONTROL ON THE GENERATOR TO MAXIMUM.
- (3) SELECT DCS ON THE CROSSBAR.

(B) PERFORM THE FOLLOWING OPERATING STEPS:

- (1) STEP THE DCS OSCILLATOR TO LOWER BANDEDGE.
- (2) TURN ON (7 1/2% POSITION) ALL OSCILLATORS AND CHECK THE FREQUENCY FOR COMPLIANCE TO IRIG FREQUENCIES $\pm 0.1\%$ BY SEQUENTIALLY SELECTING EACH OSCILLATOR ON THE DCS TEST SELECTOR PANEL AND READING THE FREQUENCY ON THE COUNTER.
- (3) REPEAT (1) AND (2) FOR BANDCENTER.
- (4) REPEAT 1 AND 2 FOR UPPER BANDEDGE.
- (5) STEP THE DCS TO BANDCENTER AND TURN OFF ALL OSCILLATORS.

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A. GENERAL REQUIREMENTS

(6) TURN ON (7 1/2% POSITION) THE OSCILLATORS ONE AT A TIME, AND CHECK THE RF GENERATOR DEVIATION METER OR THE RF DEVIATION METER FOR COMPLIANCE WITH THE PRE-EMPHASIS SCHEDULE.

(7) TURN DCS OSCILLATORS 1 THROUGH 18 TO THE ON (7 1/2% POSITIONS).

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A. GENERAL REQUIREMENTS

IRIG FREQUENCIES AND PRE-EMPHASIS

CHANNEL	LOWER BANDEDGE	CENTER FREQ, HZ	UPPER BANDEDGE	PEAK DEVIATION KHZ
1	370	400	430	5
2	518	560	602	5
3	675	730	785	5
4	888	960	1032	5
5	1202	1300	1397	6
6	1572	1700	1828	6
7	2127	2300	2473	6
8	2775	3000	3225	7
9	3607	3900	4193	7
10	4995	5400	5805	9
11	6799	7350	7901	10
12	9712	10500	11288	11
13	13412	14500	15588	12
14	20350	22000	23650	15
15	27750	30000	32250	16
16	37000	40000	43000	18
17	48562	52500	56438	20
18	64750	70000	75250	21

3. TELEMETRY INDICATOR

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A. GENERAL REQUIREMENTS

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) VERIFY THAT THERE IS NO SIGNAL APPLIED TO THE INPUT OF THE TM1.
- (2) SET SCALE SELECTOR CONTROL TO THE LIN. POSITION.
- (3) SET "SCALE MULTI" CONTROL TO THE X10 POSITION.
- (4) SET THE INPUT LEVEL STEP CONTROL CLOSKWISE TO ITS 6TH STEP.
- (5) SET THE INPUT LEVEL CONTINUOUS CONTROL CLOCKWISE APPROXIMATELY SEVEN (7) INCREMENTS.
- (6) SWEEP RANGE SELECTOR TO THE LOG POSITION.
- (7) OTHER CONTROLS CAN BE IN ANY POSITION.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

- (1) ROTATE THE LOG 350 CONTROL UNTIL THE UNBALANCE PIP APPEARS ON THE LEFT SIDE OF THE TRACE. -----
- (2) USING THE PHASE BALANCE, FINE BALANCE AND COARSE BALANCE CONTROLS ADJUST FOR MINIMUM DEFLECTION OF THE UNBALANCE PIP. -----
- (3) SELECT FM/FM ON THE TM1 INPUT SELECTOR. -----
- (4) SELECT ON THE CROSSBAR CONTROL THE DCS OUTPUT. -----
- (5) STEP THE DCS OSCILLATOR TO THE BC POSITION. -----
- (6) USING THE LOG 350 CONTROL ROTATE IT COUNTER-CLOCKWISE UNTIL THE 400 CPS PIP FROM THE DCS LINES UP ON THE 400 CPS INCREMENT OF THE SCOPE SCREEN. -----

A. GENERAL REQUIREMENTS

- (7) ADJUST THE CONTINUOUS LEVEL CONTROL SO THAT THE 70 KHZ PIP IS FULL SCALE.

4. DATA INSERTION SCO'S

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) CALIBRATE A MONITOR SCOPE USING THE DCS AS AN INPUT TO THE DISCRIMINATORS.
- (2) REMOVE THE DCS INPUT AND PATCH THE OUTPUT OF THE SCO MIXER AMP TO THE DISCRIMINATOR INPUT. SEE FIG. 2.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

- (1) MONITOR THE OUTPUT OF THE 30 KHZ DISCRIMINATOR FOR 1PPS TIMING CODE.
- (2) REPEAT FOR THE CH. 16 (40 KHZ) AND CH. 17, (52.5 KHZ) DISCRIMINATORS FOR 100 PPS AND MODIFIED 100 PPS TIMING RESPECTIVELY. ALL OUTPUT VOLTAGES SHOULD BE 50% PEAK TO PEAK OR GREATER THAN THE CALIBRATION VOLTAGE OBSERVED IN STEP (1) IT MUST NOT EXCEED EITHER CHANNEL LIMIT AS OBSERVED IN (1) OR HAVE MORE THAN 5% NOISE. CHANNEL 17 SHOWS RINGING BECAUSE OF 3.3 KHZ OUTPUT FILTER.
- (3) MODULATE THE 70 KHZ SCO WITH 400 HZ OVPP AND CONNECT THE SCO OUTPUT DIRECTLY TO THE DCS, GFD3 (TRACK 14 OUT) DISCRIMINATOR. SET THE GAIN OF THE AUDIO AMP TO MAX AND INCREASE THE OSCILLATOR OUTPUT VOLTAGE AND NOTE THE AUDIO OUTPUT OF THE STATION MONITOR SPEAKERS.
- (4) RETURN STATION TO THE NORMAL PATCHING CONFIGURATION.

B. FM/FM RECEIVING EQUIPMENT

B. FM/FM RECEIVING EQUIPMENT

1. PAM MONITOR (FM/FM EQUIPMENT)

(A) PERFORM THE FOLLOWING OPERATIONS STEPS:

- (1) SELECT 70 KC ON THE PAM SYNCHRONIZER INPUT SELECTOR. -----
- (2) ADJUST THE DISCRIMINATORS TUNING CONTROL ON THE DISCRIMINATOR OUTPUT METER FOR CENTER. -----
- (3) SELECT 49 KC ON THE PAM SYNCHRONIZER INPUT SELECTOR. -----
- (4) ADJUST THE VERTICAL POSITION AND THE VERTICAL GAIN OF THE OSCILLOSCOPE CHANNEL A, UNTIL THE Bandedge TRACE PRESENT ON THE OSCILLOSCOPE IS CALIBRATED 3 DIVISIONS BELOW THE CENTER LINE. -----
- (5) SELECT 91 KC ON THE INPUT SELECTOR. THE SCOPE TRACE SHOULD BE 3 DIVISIONS ABOVE THE CENTER LINE. -----

2. PAM SIMULATOR

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) SELECT SIMULATOR ON THE PAM SYNCHRONIZER INPUT SELECTOR
- (2) POSITION THE CONTROLS ON THE SIMULATOR AS FOLLOWS:

MODE	2W
FREQUENCY MULTIPLIER	1K
CHANNEL/FRAME	30
NOISE	MIN
JITTER	MAN
DUTY CYCLE	FREQ
AMP	MIN
OUTPUT	+
LEVEL	MIN
SUB COM	ON
FUNCTION MULTIPLIER	1
300-900 SWITCH	300
VERNIER	ANY
VAR I	MAN

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B. FM/FM RECEIVING EQUIPMENT

VAR II	MAN
VAR LEVEL	ANY
MASTER PULSE CONTROL	ANY
STEP AMPLITUDE	ANY
FUNCTION VERNIER	ANY
PGM	NORMAL
PGM STEP SWITCH	PGM
PRST STEP	STEP
CH. 1 0 REF.	0
CH. 2 F.S. REF.	F.S.
NOISE SWITCH	OFF
MASTER PULSE SWITCH	100

(3) CONNECT THE FRAME SYNC OUTPUT (J105) TO A COUNTER

(4) SELECT ANY DESIRED FORMAT ON THE PATCH BOARD FOR CHANNELS 3-16.

(5) SUB COMMUTATE CHANNELS 17 AND 18.

(B) PERFORM THE FOLLOWING OPERATING STEPS:

(1) ADJUST THE FREQUENCY VERNIER CONTROL TO OBTAIN A FREQUENCY READING OF 120 PPS, ON THE COUNTER.

(2) PERFORM ALL OF SECTION B3 AT THIS TIME.

(3) COUNT THE NUMBER OF CHANNELS DISPLAYED IN ONE COMPLETE FRAME ON THE SCOPE. IT SHOULD BE 28.

(4) VERIFY THE FORMAT SELECTED IN STEP A4 IS BEING DISPLAYED.

(5) VERIFY CHANNEL 1 IS 0% AND CHANNEL 2 IS 100%.

(6) VERIFY CHANNELS 17 & 18 ARE SUB COMMUTATED.

3. PAM SYNCHRONIZER (FM/FM EQUIPMENT)

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

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B. FM/FM RECEIVING EQUIPMENT

- (1) SELECT PAM SIMULATOR ON THE PAM SYNCHRONIZER INPUT SELECTOR.
- (2) SELECT FRAME 10 ON THE PAM SYNCHRONIZER. THE STATION CONFIGURATION NOW CONFORMS TO FIG. 3.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

- (1) ADJUST THE SCOPE TRIGGERING LEVEL TO OBTAIN A STEADY TRACE. -----
- (2) VERIFY THAT FRAME TEN IS BEING DISPLAYED ON THE SCOPE. (FRAME TEN IS THE ONLY FRAME THAT HAS SEGMENT 28 AT 100%.) -----
- (3) DEPRESS FRAME 9 ON THE PAM SYNCHRONIZER. -----
- (4) VERIFY THAT SEGMENT 28 IS NO LONGER A 100% PULSE. -----
- (5) REPEAT (3) AND (4) FOR FRAMES 1 THROUGH 8. -----

4. PAM DECOMMUTATOR

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) POSITION THE FRONT PANEL CONTROLS AS FOLLOWS:

MASTER PULSE AMP	FULLY CCW
MASTER PULSE TIME	FULLY CCW
MP CLAMP - MANUAL	MANUAL
SYNC DERIV - SLICER	SYNC. DERIV.
GAIN	FULLY CCW
ZERO	CENTER
INTEG. CONTROL	CENTER

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B. FM/FM RECEIVING EQUIPMENT

RATE VERNIER	CENTER
METER SWITCH	FREQ.
COM, RATE CHANNELS/SEC.	4 KC
INT, HI-LV	LV
SERVO OFF	OFF
MODE SELECTOR	& PAM RZ
SAMPLE DELAY	60
CHANNELS/FRAME	30
TEST SELECT	CLOCK

- (2) CONNECT THE OUTPUT OF THE PAM SIMULATOR TO THE DECOMMUTATOR INPUT. SET THE INPUT LEVEL TO THE DECOMMUTATOR TO APPROXIMATELY 10 VPP BY ADJUSTING DISCRIMINATOR NUMBER 23 OUTPUT CONTROL. THE STATION PATCHING SHOULD BE SHOWN AS IN FIG. 3.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

- (1) ADJUST THE MASTER PULSE AMP CONTROL UNTIL THE MASTER PULSE AMP INDICATOR IS ON STEADY. -----
- (2) ADJUST THE MASTER PULSE TIME CONTROL UNTIL THE MASTER PULSE TIME INDICATOR JUST BEGINS TO GLOW. -----
- (3) ADJUST THE RATE VERNIER CONTROL UNTIL THE RATE VERNIER METER IS CENTERED, -----
- (4) DISPLAY THE CLOCK OUTPUT OF THE DECOMMUTATOR AND THE OUTPUT OF THE SIMULATOR ON A DUAL TRACE SCOPE. USE THE CHOPPED POSITION ON THE SCOPE AND VERIFY THAT THE CLOCK OUTPUT IS SYNCHRONIZED WITH THE DATA INPUT -----
- (5) PLACE THE METER SWITCH IN THE MONITOR OUT POSITION. -----

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B. FM/FM RECEIVING EQUIPMENT

- (6) NOTE THE METER READING FOR THE MODE SELECTOR SWITCH
IN THE 0% POSITION AND THE 100% POSITION.
- 0% -----
100% -----
- (7) SWITCH THE MODE SELECTOR SWITCH TO PAM -RZ AND
SWITCH THE MONITOR SWITCH TO THE DEMOD 1 POSITION.
-
- (8) ADJUST THE ZERO CONTROL TO MATCH THE 0% CAL READING
TAKEN IN STEP 6.
-
- (9) SWITCH THE MONITOR SWITCH TO DEMOD 2 AND ADJUST THE
GAIN CONTROL TO MATCH THE 100% CAL READING TAKEN IN
STEP 6.
-
- (10) REPEAT STEPS 8 AND 9 TILL THE 0 AND 100% READINGS DO
NOT CHANGE OR THERE IS INTERACTION BETWEEN THE TWO
CONTROLS.
-

5. DISCRIMINATORS

(A) PERFORM THE FOLLOWING OPERATING STEPS:

- (1) STEP THE DCS TO MIDBAND AND SELECT DCS INTO THE
DISCRIMINATORS.
-
- (2) ADJUST THE DISCRIMINATOR BALANCE CONTROL FOR 0 ON
DISCRIMINATORS 1 THROUGH 18.
-
- (3) STEP THE DCS TO LOWER BAND EDGE AND CHECK EACH
DISCRIMINATOR OUTPUT METER FOR AN INDICATION MIDWAY
BETWEEN THE +/- 5% OF LOWER BAND EDGE TOLERANCE
MARKS.
-
- (4) STEP THE DCS TO UPPER Bandedge AND CHECK EACH
DISCRIMINATOR OUTPUT METER FOR AN INDICATION MIDWAY
BETWEEN THE +/- 5 OF UPPER Bandedge TOLERANCE MARKS.
-

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B. FM/FM RECEIVING EQUIPMENT

- (5) ADJUST THE OUTPUT LEVEL CONTROLS ON EACH DISCRIMINATOR FOR 10 VPP OUTPUT BAND EDGE TO BANDEDGE. -----
- (6) IF SECTION C IS TO BE PERFORMED AFTER COMPLETION OF B, GO TO SECTION C2 AND COMPLETE AT THIS TIME. -----
- (7) TUNE THE RF GENERATOR TO THE GF1 TELEMETRY FREQUENCY AND MODULATE THE RF OUTPUT WITH 70 KHZ TO OBTAIN A 40 KHZ DEVIATION. SET THE RF OUTPUT TO 5 K MICRO-VOLTS AND PATCH IT INTO THE GF1 RECEIVER. -----
- (8) INSERT THE REAL TIME VIDEO BOARD INTO THE PATCH PANEL AND SELECT GF1 ON THE X-BAR. -----
- (9) SELECT THE 70 KC +/- 30% DISCRIMINATOR ON THE INPUT TEST SELECTOR AND CALIBRATE THE SCOPE FOR 6 CM DEFLECTION OF THE 70 KC ON TRACE A. -----
- (10) SELECT DCS ON THE X-BAR AND SELECT DISCRIMINATOR NUMBER 1 ON THE OUTPUT TEST SELECTOR. -----
- (11) STEP THE DCS BETWEEN BAND EDGES AND CALIBRATE THE SCOPE FOR 6 CM DEFLECTION ON TRACE B. -----
- (12) CHECK DISCRIMINATORS 2 THROUGH 18 FOR THE SAME OUTPUT AS OBSERVED IN STEP 3. -----
- (B) PERFORM THE FOLLOWING STEPS TO SECURE THE SYSTEM:
 - (1) TURN ALL OSCILLATORS ON DCS EXCEPT NUMBER 1 TO THE ON 7 1/2% POSITION. -----
 - (2) TURN THE RF OUTPUT OF THE GENERATOR TO MINN. -----

B. FM/FM RECEIVING EQUIPMENT

6. RECEIVERS (FM/FM LINKS)

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) STEP THE DCS OSCILLATOR TO BAND CENTER (BC).
- (2) SWITCH THE RECEIVER VIDEO BANDWIDTH SWITCH TO 500 KC, ON ALL RECEIVERS.
- (3) ON THE RF PATCH PANEL CONNECT THE BOONTON GENERATOR TO THE RECEIVER RF INPUT.
- (4) MODULATE THE BOONTON WITH THE OUTPUT OF THE DCS OSCILLATOR.
- (5) ON THE BOONTON GENERATOR ROTATE THE INTERNAL MODULATION SWITCH TO THE OFF POSITION AND THE FM MODULATION CONTROL TO THE FULL CLOCKWISE POSITION.
- (6) SWITCH THE DEV. KC SWITCH TO THE 150 KC POSITION. DEVIATION METER SHOULD READ APPROXIMATELY 86 KHZ.
- (7) INSERT THE REAL TIME VIDEO PROGRAM BOARD INTO STATION. THE STATION CONFIGURATION NOW CONFORMS TO THE BLOCK DIAGRAM FIG. 4.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

- (1) TUNE THE BOONTON GENERATOR TO THE GF1 TELEMETRY RECEIVER AND ADJUST THE RF OUTPUT FOR 10 K MICROVOLT SIGNAL STRENGTH.
- (2) SELECT ON THE X BAR THE DCS. VERIFY THAT ALL SUBCARRIER DISCRIMINATORS ARE READING MID SCALE ON THE INPUT LEVEL MEIER.
- (3) SELECT ON THE X BAR THE GF1 TELEMETRY LINK.
- (4) ADJUST THE OUTPUT LEVEL CONTROL ON THE RECEIVER SO THAT THE LEVEL INDICATIONS ON THE DISCRIMINATORS MATCHES THE LEVELS OBTAINED IN STEP 2.

B. FM/FM RECEIVING EQUIPMENT

(5) REPEAT STEPS 1 THROUGH 4 FOR ALL FM/FM TELEMETERS. -----

(C) PERFORM THE FOLLOWING STEPS TO SECURE THE SYSTEM:

(1) ON THE RF PATCH PANEL DISCONNECT THE "SIGNAL GEN. OUTPUT" AND RECONNECT THE ANTENNA INPUT TO THE RECEIVER RF INPUT. -----

(2) ON THE RF PATCH PANEL DISCONNECT THE "SIGNAL GEN. OUTPUT" AND RECONNECT THE ANTENNA INPUT TO THE RECEIVER RF INPUT. -----

(3) TURN THE RF OUTPUT OF THE GENERATOR TO MIN. -----

7. FM/FM PATCHING

VERIFY THE FM/FM STATION PATCHING ACCORDING TO THE PATCHING WIRE LIST, DRAWING NUMBER VE2-02151.

C. SS/FM RECEIVING EQUIPMENT

1. SS/FM RECEIVING EQUIPMENT

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

(1) ADJUST THE OUTPUT OF THE MIXER AMPLIFIER AND THE DEMULTIPLEXER INPUT LEVEL CONTROL TO MAX.

(2) TURN OFF ALL VCO'S IN THE SSB SIGNAL SIMULATOR.

(3) PATCH THE CH. 1 SS/FM FREQ. OUTPUT TO THE COUNTER INPUT ON THE TEST PATCH PANEL.

(4) SELECT CAL ON THE SSB DEMUX INPUT SELECTOR.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

(1) MONITOR THE DEMUX INPUT AND ADJUST THE PILOT LEVEL FOR 1.0 VPP INPUT.

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C. SS/FM RECEIVING EQUIPMENT

- (2) TURN OFF THE PILOT, TURN ON VCO NUMBER 1, AND ADJUST ITS OUTPUT FOR 0.42 VPP AT THE DEMUX INPUT.
- (3) REPEAT STEP 2 FOR VCO'S 2 THRU 16 BE SURE ONLY ONE VCO IS ON AT A TIME.
- (4) TURN ON ALL VCO'S AND THE PILOT, AND VERIFY THAT THE ALARM LIGHT IS NOT LIT.
- (5) WITH THE METER SELECTOR IN THE REG. IN POSITION ADJUST THE INPUT LEVEL CONTROL ON THE DEMUX FOR A-5DB READING ON THE INPUT METER.
- (6) WITH THE METER SELECTOR IN THE REG. OUT POSITION ADJUST THE REG. ADJ CONTROL FOR A-10DB METER READING
- (7) ADJUST THE "LEVEL ADJ." CONTROL ON THE DEMULTIPLEXER CHANNEL 1 AMPLIFIER FOR 4 VOLTS PEAK-TO-PEAK AS DISPLAYED ON THE OSCILLOSCOPE AND MONITOR AT A FREQUENCY OF 1.5 KHZ, THE VCO'S MAY BE ADJUSTED TO OBTAIN ~~1.7~~ KHZ +/- 10HZ.
1.5
- (8) REPEAT STEPS 1, 2, AND 3 FOR CHANNELS 2 THROUGH 16 EXCEPT THAT THE CHANNEL 16 VCO IS NOT ADJUSTED FOR FREQUENCY AT THIS TIME.
- (9) SET THE "OUTPUT SELECT" SWITCH TO CHANNEL 16.
- (10) ADJUST THE 1100 HZ VCO FOR AN OUTPUT FREQUENCY OF 1032 HZ +/- 10 HZ.
- (11) ADJUST THE DISCRIMINATOR BALANCE CONTROL FOR CORRECT UPPER BAND EDGE READING ON THE OUTPUT METER

C. SS/FM RECEIVING EQUIPMENT

- (12) VERIFY THAT THE ALARM LIGHT IS LIT WHEN NO SIGNAL IS APPLIED TO THE SYSTEM.

2. RECEIVERS (SSB AND PCM LINKS)

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) SWITCH THE RECEIVER VIDEO BANDWIDTH SWITCH TO 250 KC ON ALL RECEIVERS.
- (2) ON THE RF PATCH PANEL CONNECT THE BOONTON GENERATOR TO THE RECEIVER RF INPUT.
- (3) FM MODULATE THE RF GENERATOR OUTPUT TO OBTAIN A 100KHZ DEVIATION AT A 70 KHZ DEVIATION FREQUENCY.
- (4) INSERT THE REAL TIME VIDEO PROGRAM BOARD INTO STATION.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

- (1) TUNE THE RF GENERATOR TO A SSB TELEMETRY RECEIVER AND ADJUST THE RF OUTPUT FOR 10 K MICROVOLT SIGNAL STRENGTH.
- (2) SELECT SSB LINK ON SELECTOR OF SS/FM CONTROL PANEL ADJUST THE VIDEO OUTPUT LEVEL CONTROL ON THE RECEIVER SO THAT THE OUTPUT IS 3 VPP AS MONITORED ON TRACE B OF THE SSB SCOPE.
- (3) REPEAT STEPS 1 AND 2 FOR ALL SSB RECEIVERS.
- (4) PATCH PCM VIDEO NUMBER 1 ON TEST PANEL TO SCOPE TRACE A, SET REC. VIDEO OUTPUT FOR 3 VPP AND REPEAT FOR REMAINING PCM RECEIVERS.

(C) PERFORM THE FOLLOWING STEPS TO SECURE THE SYSTEM:

- (1) ON THE RF PATCH PANEL DISCONNECT THE "SIGNAL GEN. OUTPUT" AND RECONNECT THE ANTENNA OUTPUT TO THE RECEIVER RF INPUT.

C. SS/FM RECEIVING EQUIPMENT

(2) TURN THE RF OUTPUT OF THE GENERATOR TO MIN.

3. 450 KHZ DEMODULATORS

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) CONNECT THE RF GENERATOR TO THE RECEIVER RF INPUT.
- (2) FM MODULATE THE RF GENERATOR OUTPUT TO OBTAIN A 75 KHZ DEVIATION AT A 70 KHZ DEVIATION FREQUENCY.
- (3) PATCH THE PRE-D OUTPUT OF THE GS-1 TELEMETER RECEIVER INTO THE SSB 450 KHZ DEMOD AS SHOWN ON FIG. 6.
- (4) SET THE RF OUTPUT LEVEL OF THE GENERATOR TO 5 K MICROVOLTS.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

- (1) ADJUST THE OUTPUT LEVEL OF THE DEMODULATOR FOR 3 V PEAK TO PEAK.
- (2) REPEAT STEP 3 FOR TELEMETER RECEIVERS CS-1 AND DS-1 AND NOTE THAT THE DEMOD OUTPUTS DO NOT CHANGE.
- (3) REPEAT STEPS 3(A) AND 3(B) FOR GP-1, CP-1 AND DP-1, NOTE THAT THE 450 KC DEMOD INPUT AND OUTPUT IS LOCATED ON THE TRS-1 PATCH PANEL

4. SS/FM PATCHING

VERIFY THE SS/FM STATION PATCHING ACCORDING TO THE PATCHING WIRE LIST DRAWING NUMBER VE2-02151.

D. TRS-1 RECEIVING EQUIPMENT

1. PCM SIMULATOR AND 600 KC DEMODULATOR

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D. TRS-1 RECEIVING EQUIPMENT

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) SWITCH TO SIMULATOR ON THE TRS-1 SYNCHRONIZER.
- (2) CONNECT THE 600 KHZ OUTPUT OF THE SIMULATOR TO THE INPUT OF THE 600 KHZ DEMODULATOR ON THE TRS-1 PATCH PANEL.
- (3) PROGRAM GROUP A, MUX 0, FRAME 0 AND CHANNEL 1 ON THE SIMULATOR SET THE PROGRAM WORD SWITCH TO 4 AND ALL PROGRAM WORD SWITCHES TO THE "0" DOWN POSITION.
- (4) ACQUIRE SYNCHRONIZATION ON THE TRS-1 AND SET THE QUICK LOOK TO THE ADDRESS CALLED OUT IN STEP 3.

(B) PERFORM THE FOLLOWING OPERATING STEPS:

- (1) MONITOR THE 600 KHZ OUTPUT OF THE SIMULATOR FOR A 5 VPP SIGNAL OR GREATER. -----
- (2) MONITOR THE VIDEO OUTPUT OF THE SIMULATOR FOR A 5 VPP OR GREATER SIGNAL. -----
- (3) MONITOR THE QUICK LOOK DIGITAL DISPLAY FOR ALL ZEROS (ALL LAMPS OUT). -----
- (4) ON THE SIMULATOR SET THE TOP ROW OF PROGRAM WORD SWITCHES TO THE "1" (UP POSITION) - MONITOR THE QUICK LOOK FOR ALL LAMPS LIT. -----
- (5) ADDRESS THE QUICK LOOK TO GROUP B, MUX 0, FRAME 0 AND CHANNEL 1, MONITOR THE DIGITAL DISPLAY FOR ALL LAMPS OUT. -----
- (6) SET THE SECOND ROW OF PROGRAM WORD SWITCHES ON THE SIMULATOR TO THE "1" (UP POSITION) AND MONITOR THE QUICK LOOK FOR ALL LAMPS LIT. -----
- (7) ADDRESS THE QUICK LOOK TO GROUP A, MUX 0, FRAME 0, CHANNEL 2 AND REPEAT STEPS 4 AND 5 FOR THE THIRD ROW

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D. TRS-1 RECEIVING EQUIPMENT
OF PROGRAM WORD SWITCHES.

- (8) ADDRESS THE QUICK LOOK TO GROUP B; MUX 0, FRAME 0, CHANNEL 2 AND REPEAT STEPS 4 AND 5 FOR THE FOURTH ROW OF PROGRAM WORD SWITCHES.
- (9) SWITCH TO REC. ON THE SYNCHRONIZER AND CONNECT THE VIDEO OUTPUT OF THE 600 KHZ DEMODULATOR TO THE TRS-1 INPUT ON THE TRS-1 PATCH PANEL. MONITOR THE STATION FOR PROPER SYNCHRONIZATION BY OBSERVING THE FRAME LOCK AND MASTER FRAME LOCK LAMPS THAT ARE LIT.

2. TRS-1 SYNCHRONIZER FUNCTION TEST

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) PATCH THE SIMULATOR 600 KHZ TO THE 600 KHZ DEMOD INPUT AND PATCH THE DEMOD VIDEO OUTPUT TO THE TRS-1 INPUT ON THE TRS-1 PATCH PANEL.
- (2) SWITCH THE RECORD OR SIMULATOR SWITCH TO THE POS. POSITION.
- (3) SWITCH THE SIGNAL SELECTOR SWITCH TO THE NRZ SPACE POSITION.
- (4) SWITCH THE REC.-SIMULATOR-TAPE SELECTOR SWITCH TO THE SIMULATOR POSITION.
- (5) SWITCH THE DATA SAMPLE INVERSION SWITCH TO THE UP POSITION.
- (6) SWITCH THE CH A AND CH B SWITCH TO THE CH A POSITION.
- (7) SWITCH THE FREQUENCY SELECTION KC SWITCH TO THE 50 - 100 KC POSITION.
- (8) SWITCH THE LOOP BANDWIDTH TO THE .08% POSITION.
- (9) SWITCH THE VCO/XTAL SWITCH TO THE VCO MODE.
- (10) SWITCH THE HIGH-LOW SWITCH TO THE LOW POSITION AND THE SERVO LOOP TO CLOSED POSITION.

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D. TRS-1 RECEIVING EQUIPMENT

(B) PERFORM THE FOLLOWING OPERATING STEPS:

- (1) MONITOR THE SIGNAL AT CHANNEL A AMP OUT AND ADJUST THE GAIN CONTROL FOR APPROXIMATELY 2 VOLTS PEAK-TO-PEAK SIGNAL AMPLITUDE. ADJUST POTENTIOMETER ON THE RIGHT SIDE OF CARD Z3 TO CENTER THIS SIGNAL ABOUT GROUND.
- (2) MONITOR THE SIGNAL AT CHANNEL A DET IN JACKS. THE SIGNAL SHOULD BE APPROXIMATELY 5 VOLTS PEAK-TO-PEAK. ADJUST POTENTIOMETER ON RIGHT SIDE OF Z5 TO CENTER THIS SIGNAL.
- (3) ADJUST BOTH CHANNELS OF A DUAL TRACE SCOPE FOR EQUAL GAIN AND SUPERIMPOSE THE TWO TRACES.
- (4) CONNECT ONE SCOPE PROBE TO CHANNEL A DET IN JACK AND THE OTHER PROBE TO CHANNEL A LEVEL JACK. ADJUST POTENTIOMETER ON THE CARD Z6 TO CENTER THE LEVEL SIGNAL WITH RESPECT TO THE DET IN SIGNAL.
- (5) CHECK SIGNAL AT CHANNEL A DET OUT JACK. THE SIGNAL SHOULD BE A NEGATIVE GOING DATA TRAIN VARYING FROM GROUND TO -11 ± 1 VOLT.
- (6) CHECK THE CLOCK SIGNAL AT THE CLOCK JACK. THE SIGNAL SHOULD BE NEGATIVE GOING CLOCK PULSES VARYING FROM GROUND TO -11 ± 1 VOLT.

3. SYNCHRONIZER BIT RATE CHECK

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) CONNECT THE CLOCK OUTPUT OF THE SYNCHRONIZER TO THE ELECTRONIC COUNTER.
- (2) SWITCH GAIN CONTROL ON THE SYNCHRONIZER TO GROUND.
- (3) SWITCH THE SERVO LOOP SWITCH TO THE OPEN POSITION.

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D. TRS-1 RECEIVING EQUIPMENT

(4) SWITCH THE VCO-XTAL SWITCH TO THE XTAL POSITION.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

(1) SWITCH THE FREQUENCY SELECTION SWITCH TO THE 50 - 100 KC POSITION. THE COUNTER READOUT SHOULD BE 72 KHZ +/- 2 KHZ.

(2) SWITCH THE VCO-XTAL MODE SWITCH TO THE VCO MODE.

(3) THE COUNTER READOUT SHOULD BE 72 KHZ +/- 2 KHZ.

(4) VARY THE FINE FREQUENCY ADJUSTMENT FROM ONE EXTREME TO THE OTHER VERIFY THAT THE COUNTER READOUT FOLLOWS THE VARIATION.

(5) RETURN THE FINE FREQUENCY ADJUSTMENT TO 72 KHZ.

(C) SECURING THE TRS-1.

(1) SWITCH THE SERVO LOOP SWITCH TO THE CLOSE POSITION.

(2) SWITCH THE GAIN SWITCH TO THE MID POSITION.

(3) SWITCH THE VCO-XTAL SWITCH TO XTAL.

(4) DISCONNECT THE CONNECTION BETWEEN THE ELECTRONIC COUNTER AND THE CLOCK ON THE SYNCHRONIZER.

4. FRAME AND MASTER FRAME THRESHOLD TEST.

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

(1) ATTAIN SYNC ON THE TRS-1 GROUND STATION USING THE SIMULATOR 600 KHZ OR VIDEO AS A SIGNAL SOURCE.

(2) PULL THE DIGITAL SIGNAL SIMULATOR DRAWER OUT TO EXPOSE THE FORMAT SWITCHES.

(B) PERFORM THE FOLLOWING OPERATING STEPS:

D. TRS-1 RECEIVING EQUIPMENT

- (1) SWITCH THE QUICK LOOK SWITCHES TO WORD 29B MUX 1, 2 OR 3 FRAME SWITCH IN ANY FRAME EXCEPT 10. -----
- (2) NOTE THE QUICK LOOK DISPLAY OF WORD 29B IN ITS DIGITAL FORM IS 1, 0, 1, 1, 0, 1, 1, 1, 1, 0, 29B IS THE FIRST WORD OF THE FRAME SYNC WORDS. -----
- (3) SET UP THIS SAME DIGITAL WORD ON THE DIGITAL SIGNAL SIMULATOR IN THE BOTTOM (FOURTH) WORD. BIT SWITCHES IN THE UP POSITION IS IN THE ONE "1" STATE. BIT SWITCHES THE ZERO "0" POSITION ARE DOWN. -----
- (4) SWITCH THE SYNC ERROR SWITCH TO THE ON POSITION. THE STATION SHOULD MAINTAIN SYNC. VERIFY THAT THE FRAME LOCK LIGHT AND THE MASTER FRAME LOCK LIGHT ON THE DATA CONTROL PANEL ARE ON. -----
- (5) SWITCH BIT 9 OF THE FOURTH WORD TO THE "0" POSITION. VERIFY THE STATION MAINTAINS SYNC. IF THE STATION LOSES SYNC, ROTATE THE FRAME SYNC AND MASTER FRAME SYNC THRESHOLD CONTROL CLOCKWISE UNTIL FRAME LOCK LIGHT AND THE MASTER FRAME LOCK LIGHTS TURN ON. -----
- (6) SWITCH BITS 8 AND 7 TO THE "0" POSITION AND REPEAT THE ABOVE STEP. -----
- (7) SWITCH BIT 6 TO THE "0" POSITION. IF THE STATION DOES NOT LOSE SYNC ADJUST THE FRAME SYNC AND MASTER FRAME SYNC THRESHOLD CONTROLS COUNTER CLOCKWISE UNTIL THE FRAME LOCK AND MASTER FRAME LOCK LIGHTS GO OUT. -----
- (8) LOCK THE FRAME SYNC THRESHOLD AND MASTER FRAME SYNC THRESHOLD CONTROL AT ITS PRESENT SETTING. -----
- (9) TURN THE SYNC ERROR SWITCH TO THE OFF POSITION AND CLOSE DRAWER. -----

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D. TRS-1 RECEIVING EQUIPMENT

5. DECOMUTATOR AND DECODING ACCURACY CHECK

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) SYNCHRONIZE THE STATION ON THE SIMULATOR 600 KHZ OR VIDEO OUTPUT.
- (2) SWITCH THE MODE SELECTOR TO THE CALIBRATE POSITION.
- (3) SWITCH THE DECIMAL CALIBRATE SWITCH TO THE MAN. CAL POSITION.
- (4) SWITCH THE CALIBRATE CONTROL SWITCHES TO THE DOWN "0" POSITION.
- (5) SET ANALOG POLARITY SWITCH TO POS. POSITION.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS TO DETERMINE THE DECODING ACCURACY:

- (1) DEPRESS THE SET BUTTON ON THE DAC CALIBRATOR. -----
- (2) WITH THE DANA VOLTMETER, MONITOR THE OUTPUT OF EACH DAC ASSEMBLY. THE METER READING SHOULD BE 0 V +/- .01 VOLTS. -----
- (3) SWITCH BIT, SWITCH 64, ONLY TO THE UP "1" POSITION. DEPRESS THE SET BUTTON ON THE DAC CALIBRATOR. -----
- (4) WITH THE DANA VOLTMETER, MONITOR THE OUTPUT OF EACH DAC ASSEMBLY. THE METER READING SHOULD BE 2.5 2 VDC +/- .020 VDC. -----
- (5) RETURN BIT 64 TO ZERO AND SWITCH BIT, SWITCH 128, ONLY TO THE "1" POSITION. DEPRESS THE SET SWITCH. -----
- (6) MONITOR EACH DAC OUTPUT. THE VOLTAGE SHOULD BE 5.020 VDC +/- .020 VDC. -----

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D. TRS-1 RECEIVING EQUIPMENT

- (7) SWITCH ALL THE BIT SWITCHES TO THE "1" POSITION AND DEPRESS THE SET SWITCH. -----
- (8) MONITOR EACH D/A OUTPUT, THE VOLTAGE SHOULD BE ± 10.00 VDC $\pm .02$ VDC. -----
- (C) PERFORM THE FOLLOWING OPERATIONAL STEPS TO DETERMINE THE ADDRESS ACCURACY:
 - (1) SWITCH THE MODE SELECTOR SWITCH TO THE OPERATE POSITION. -----
 - (2) PROGRAM THE DIGITAL SIGNAL SIMULATOR WORD NO. ONE TO A KNOWN TELEMETRY CHANNEL TIME SLOT. PATCH THIS WORD INTO A KNOWN D/A GATE. -----
 - (3) PUT THE BIT SWITCHES OF WORD ONE IN THE SIGNAL SIMULATOR TO THE DOWN "0" POSITION. -----
 - (4) MONITOR THE OUTPUT OF THE D/A GATE SELECTED IN STEP 2, THE READING SHOULD BE 0 V. -----
 - (5) USING THE QUICK LOOK PANEL, MONITOR THE WORD SELECTED IN STEP 2. -----
 - (6) SWITCH THE MOST SIGNIFICANT BIT ON THE SIGNAL SIMULATOR TO THE "1" POSITION, THE MOST SIGNIFICANT BIT LIGHT SHOULD COME ON THE QUICK LOOK PANEL. THE D/A GATE OUTPUT SHOULD INDICATE 50% OUTPUT. -----
 - (7) REPEAT STEPS 3 THROUGH 6 FOR ALL 10 D/A GATES. -----

6. RECEIVERS (PCM LINKS)

IDENTICAL TO SECTION C2 EXCEPT THAT PCM LINKS ARE SUBSTITUTED FOR THE SSB LINKS,

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D. TRS-1 RECEIVING EQUIPMENT

7. VERIFY THE PCM/FM STATION PATCHING ACCORDING TO THE PATCHING WIRE LIST NUMBER VE2-02151.

E. COMMON EQUIPMENT

1. TAPE RECORDER CHECK

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) REMOVE THE ASSIGNED INPUT CONNECTIONS TO THE TAPE RECORDER.
- (2) SELECT DCS ON THE CROSSBAR CONTROL PANEL.
- (3) STEP THE DCS TO MIDBAND.
- (4) ADJUST THE TELEMETER INDICATOR FOR A NORMAL DISPLAY.
- (5) DISPLAY THE OUTPUT OF THE 70 KHZ DISCRIMINATOR ON A SCOPE.
- (6) USING THE DCS OSCILLATOR CALIBRATE THE SCOPE FOR A 7.5 CM DEFLECTION FOR A + AND - 3.75% DEVIATION OF THE 70 KHZ SIGNAL. THE SCOPE IS NOW CALIBRATED FOR 1%/CM.
- (7) STEP THE DCS OSCILLATOR TO MIDBAND AND INCREASE THE SCOPE VERT SENSITIVITY 10 TIMES.
- (8) SELECT EXTERNAL ON THE TMI INPUT SELECTOR. THE STATION NOW CONFORMS TO THE BLOCK DIAGRAM FIG. 7.

(B) PERFORM THE FOLLOWING OPERATING STEPS:

- (1) CONNECT THE OUTPUT OF THE DCS TO TRACK 1 INPUT AND TRACK 1 OUTPUT TO THE EXTERNAL TMI JACK INPUT. SET THE RECORD LEVEL OF TRACK 1 TO 0 DB. START THE RECORDER IN THE RECORD MODE AND MONITOR THE TMI FOR A NORMAL SUB-CARRIER PRE-EMPHASIS DISPLAY.
- (2) REPEAT STEP 1 FOR TRACKS 2, 5, 6, 7, 10, 11 AND 14.

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E. COMMON EQUIPMENT

- (3) RETURN THE DCS OUTPUT TO TRACK 7 AND TURN OFF CHANNELS 16 AND 17. RECORD THIS SIGNAL FOR ABOUT 5 MINUTES THEN REWIND THE TAPE TO PLAY BACK THIS SIGNAL.
- (4) SELECT TRACK 7 AS AN INPUT TO THE DISCRIMINATORS AND START THE RECORDER IN PLAYBACK.
- (5) MONITOR THE SCOPE FOR % OF WOW AND FLUTTER .4% OR LESS IS ACCEPTABLE.
- (6) PATCH THE OUTPUT OF AN AUDIO OSCILLATOR TO THE INPUT OF TRACK 3 AND MONITOR THE OUTPUT OF TRACK 3 WITH AN AC VOLT METER. SET THE FREQUENCY TO 450 KHZ AND THE INPUT LEVEL TO 3 VPP AND START THE RECORDER IN THE RECORD MODE.
- (7) SET THE INPUT TO TRACK 3 FOR 0 DB AND MONITOR THE OUTPUT FOR 0 DB +/- 1 DB.
- (8) REPEAT STEPS 6 AND 7 FOR TRACKS 4, 8, 9, 12 AND 13.
- (9) RETURN THE STATION TO THE NORMAL PATCHING CONFIGURATION.

2. HONEYWELL 1612 VISICORDER TEST

*****WARNING*****

THE RECORDING LAMP USED IN THE OSCILLOGRAPH IS A HIGH PRESSURE MERCURY VAPOR LAMP THAT EMITS ULTRAVIOLET LIGHT. UNDER NORMAL OPERATING CONDITIONS, THE LAMP IS SHIELDED TO PROTECT THE OPERATOR. IF IT SHOULD BECOME NECESSARY TO BE EXPOSED TO THIS LIGHT WHILE MAKING ADJUSTMENTS, SUITABLE EYE PROTECTION SHOULD

E. COMMON EQUIPMENT

BE WORN, AND THE LAMP SHOULD
NEVER BE VIEWED DIRECTLY.

*****WARNING*****

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) INSERT THE REAL TIME VIDEO PROGRAM PATCHBOARD INTO THE CORRESPONDING PANEL.
- (2) PATCH THE OUTPUT OF THE SSB DEMUX CHANNELS 1-15 TO THE INPUTS OF CHANNELS 1-15 OF THE VISICORDER ON THE TEST PATCH PANEL. PATCH CHANNEL 16 TO THE SSB ALARM, CHANNEL 17 TO THE 960 DISCR, OUT AND CHANNEL 18 TO TIMING DISCR. OUT.
- (3) SET OSCILLOGRAPH CONTROL AS FOLLOWS: GRID INTENSITY - MEDIUM; SPOT INTENSITY - AUT; TIMELINE INTERVAL - 1; POWER - GREEN; LAMP - GREEN; DRIVE - GREEN; GRID LINES - GREEN; AUTO RECORD - NOT ILLUMINATED; PAPER HEAT - NOT ILLUMINATED; SPEED - 1 IPS; LATENSIFIER LIGHTS - WHITE ON, CONTROL NOT MENTIONED MAY BE IN ANY POSITION.

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

- (1) PULL THE OSCILLOGRAPH FROM THE RACKS ON ITS EXTENDER RAILS AND OPEN THE HINGED TOP COVER, -----
- (2) VERIFY THAT THE RECORDING LAMP HAS STABILIZED BY OBSERVING THE GALVANOMETER LIGHT SPOTS FROM THE FRONT OF THE OSCILLOGRAPH, -----
- (3) REMOVE POWER FROM THE SSB SIMULATOR AND INSERT A GALVANOMETER ADJUSTING TOOL INTO THE SLOT IN THE TOP OF GALVANOMETER NO. 2, -----
- (4) TURN THE GALVANOMETER AS REQUIRED TO POSITION THE SPOT IN THE CENTER OF LOCATOR LABELED NO. 2 AS VIEWED FROM THE FRONT OF THE OSCILLOGRAPH, -----
- (5) REPEAT STEPS 3 AND 4 FOR GALVANOMETER 3 THROUGH 18, -----

E. COMMON EQUIPMENT

- (6) POSITION GALVANOMETERS 20 THROUGH 23 SO THAT THEIR LIGHT SPOTS DO NOT APPEAR ON THE OSCILLOGRAPH PAPER, -----
- (7) THE SPOT FOR GALVANOMETER NO. 1 SHOULD APPEAR AS A 1 PPS SIGNAL (TIMING), CENTER THIS SIGNAL BENEATH THE POSITION OF THE LOCATOR LABELED "TIMING". -----
- (8) ADJUST THE PEAK-TO-PEAK DEFLECTION OF GALVANOMETER NO. 1 TO APPROXIMATELY 1/4 INCH UTILIZING THE GALVANOMETER GAIN CONTROL, -----
- (9) CENTER THE SIGNAL ON GALVANOMETER NO. 1 BENEATH LOCATOR POSITION 1 ~~(ALSO 1 PPS TIMING)~~. -----
- (10) REPEAT STEP 9 FOR CHANNEL 2-17.
- (11) APPLY POWER TO THE SSB SIMULATOR AND ADJUST THE DEFLECTION OF CHANNEL 1 TO 1/2 INCH P-P UTILIZING THE GALVANOMETER AMPLIFIER GAIN ADJUSTMENT. (THE GALVANOMETER AMPLIFIERS ARE LOCATED ABOVE THE OSCILLOGRAPH AND ARE NUMBERED FROM LEFT TO RIGHT AND TOP TO BOTTOM, 1 THROUGH 18, TO CORRESPOND TO THE FIRST 18 GALVANOMETER CHANNELS.) -----
- (12) TURN THE OSCILLOGRAPH ON IN THE RECORD MODE, VERIFY APPROXIMATELY EQUAL DEFLECTIONS ON ALL CHANNELS AND NO OVERLAYS OF TRACES. -----
- (13) TURN THE OSCILLOGRAPH LAMP OFF IF NO RECORDING IS PLANNED WITHIN THE NEXT HOUR, -----

3. CIF INTERFACE

INFORMATION NOT AVAILABLE AT THIS TIME.

4. ANTENNA POSITION CONTROL TEST

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

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E. COMMON EQUIPMENT

- (1) REQUEST THAT AN OPERATOR PROCEED TO THE BLOCKHOUSE ROOF WITH A MAGNETIC COMPASS AND A NORCOM HEADSET. HE WILL VISUALLY VERIFY ANTENNA AZIMUTH.

*****CAUTION*****

THE ROOF OPERATOR SHOULD REMAIN CLEAR OF THE ANTENNA AT ALL TIMES.

*****CAUTION*****

(B) PERFORM THE FOLLOWING OPERATIONAL STEPS:

- (1) OPERATE THE CW OR CCW CONTROL UNTIL THE METER INDICATES "N" (NORTH). THE ROOF OPERATOR WILL VERIFY THAT THE ANTENNA IS POINTING NORTH, USING THE MAGNETIC COMPASS.
- (2) OPERATE THE CW OR CCW CONTROL UNTIL THE METER INDICATES "P". THE ROOF OPERATOR WILL VERIFY THAT THE ANTENNA IS POINTING DIRECTLY AT THE PAD,

F. TELEMETRY MONITOR STATION

1. TELEMETRY INDICATOR (MONITOR STATION)

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

- (1) SET THE FRONT PANEL CONTROLS AS FOLLOWS:

FREQ SCALE	LOG
AMPLITUDE SCALE	LIN
VIDEO FILTER	OUT
SCALE MULTIPLIER	X10
ATTENUATOR	X10
GAIN	MIN
ALL OTHER CONTROLS	ANY SETTING

F. TELEMETRY MONITOR STATION

(2) DISPLAY THE DCS ON THE SCREEN

(B) PERFORM THE FOLLOWING OPERATING STEPS:

(1) ADJUST THE GAIN CONTROL FOR AN ON SCALE DISPLAY

(2) ADJUST THE 350 CPS CONTROL FOR THE 400 CPS PIP TO ALIGN WITH THE 400 CPS MARKER ON THE SCALE.

(3) ADJUST THE 5 KC CONTROL FOR THE 5.4 KC PIP TO ALIGN WITH THE 5.4 KC MARKER ON THE SCALE.

(4) ADJUST THE 85 KC CONTROL FOR THE 70 KC PIP TO ALIGN WITH THE 70 KC MARKER ON THE SCALE.

(5) REPEAT STEPS 2, 3 AND 4 AS THERE IS SOME INTERACTION BETWEEN CONTROLS.

2. PAM MONITOR (MONITOR STATION)

SAME AS SECTION B1.

3. PAM SYNCHRONIZER (MONITOR STATION)

SAME AS SECTION B3.

4. SWITCHING DISCRIMINATOR

(A) PERFORM THE FOLLOWING PREPARATORY STEPS:

(1) PATCH THE DCS OSCILLATOR INTO THE VIDEO MATRIX OUT POSITION ON THE PATCH AND SWITCH PANEL.

(2) SELECT DISCR IN ON THE SCOPE A IN, AND COUNTER IN, INPUT SELECTOR.

(3) SELECT DISCR OUT ON THE SCOPE B IN, INPUT SELECTOR.

(4) STEP THE DCS TO THE MIDBAND POSITION.

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F. TELEMETRY MONITOR STATION

(5) SET THE DISCRIMINATORS CONTROLS AS FOLLOWS:

CHANNEL SELECTOR	400 CPS
FUNCTION	OPER.
OFFSET	ANY
AMP GAIN	5.3
RANGE	ON SCALE METER READING.

(B) PERFORM THE FOLLOWING OPERATING STEPS:

- (1) CHECK THE DEVIATION METER A FOR 0% +/- .25% READING -----
- (2) CHECK THE SCOPE READING TRACE B FOR 0 VDC +/- .1 VDC -----
- (3) CHECK THE COUNTER FOR A CORRECT READING ACCORDING
TO THE CHANNEL SELECTOR POSITION. -----
- (4) REPEAT FOR CHANNELS 2-18 AND E. -----
- (5) SWITCH THE DCS TO UPPER BAND EDGE, AND THE BAND
SELECTOR SWITCH ON THE DISCRIMINATOR TO 400 CPS. -----
- (6) CENTER THE SCOPE B TRACE ON GROUND AND ADJUST THE
GAIN FOR 2 VPP/CM. ADJUST THE AMP GAIN CONTROL ON THE
DISCRIMINATOR FOR A 2.5 CM DEFLECTION ON THE SCOPE. -----
- (7) CHECK THE DEVIATION METER FOR A READING OF 7.5%
FOR CHANNELS 1-18 AND E. -----
- (8) REPEAT STEP 7 FOR THE LOWER BAND EDGE SETTING ON
THE DCS. -----

5. RECEIVERS

SEE SECTION B6 FOR FM/FM TELEMETRY RECEIVERS AND SECTION C2
FOR SSB AND PCM TELEMETRY RECEIVERS.

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F. TELEMETRY MONITOR STATION

6. MONITOR STATION PATCHING

VERIFY THE MONITOR STATION PATCHING ACCORDING TO THE PATCHING
WIRE LIST DRAWING NUMBER VE2-02151.

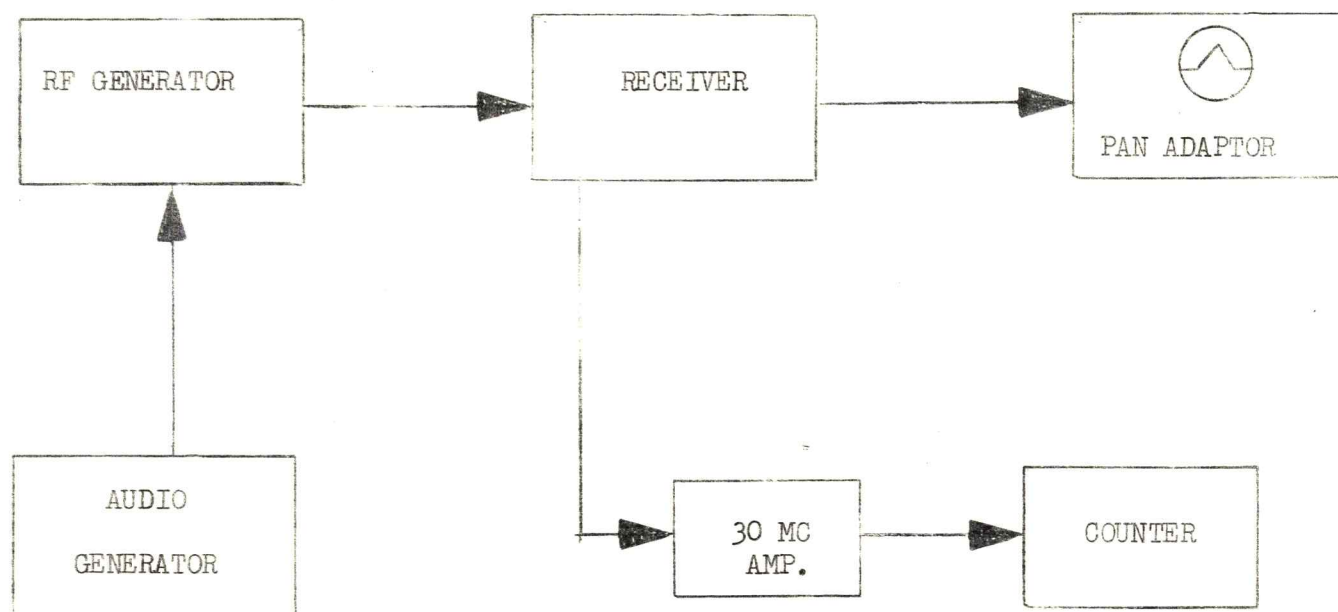


FIG. 1 - RF GENERATOR, DEVIATION METER, SPECTRUM DISPLAY UNIT
AND 30 MC AMP.

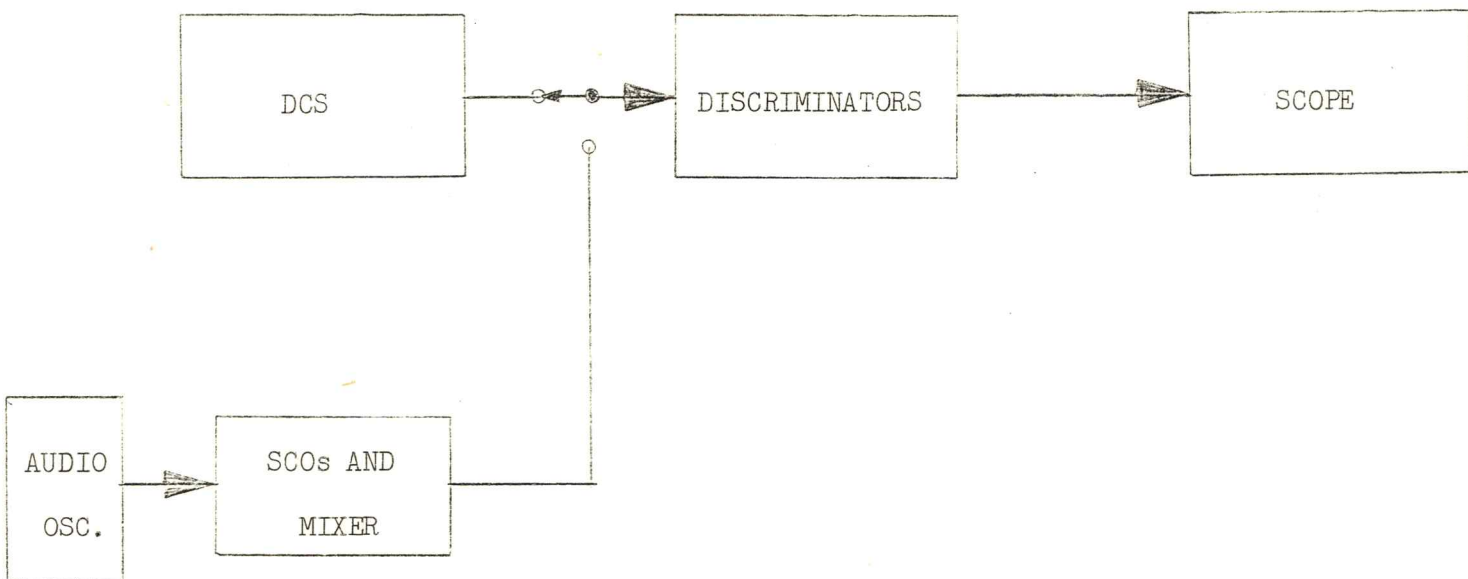


FIG. 2 - DATA INSERTION SCO'S

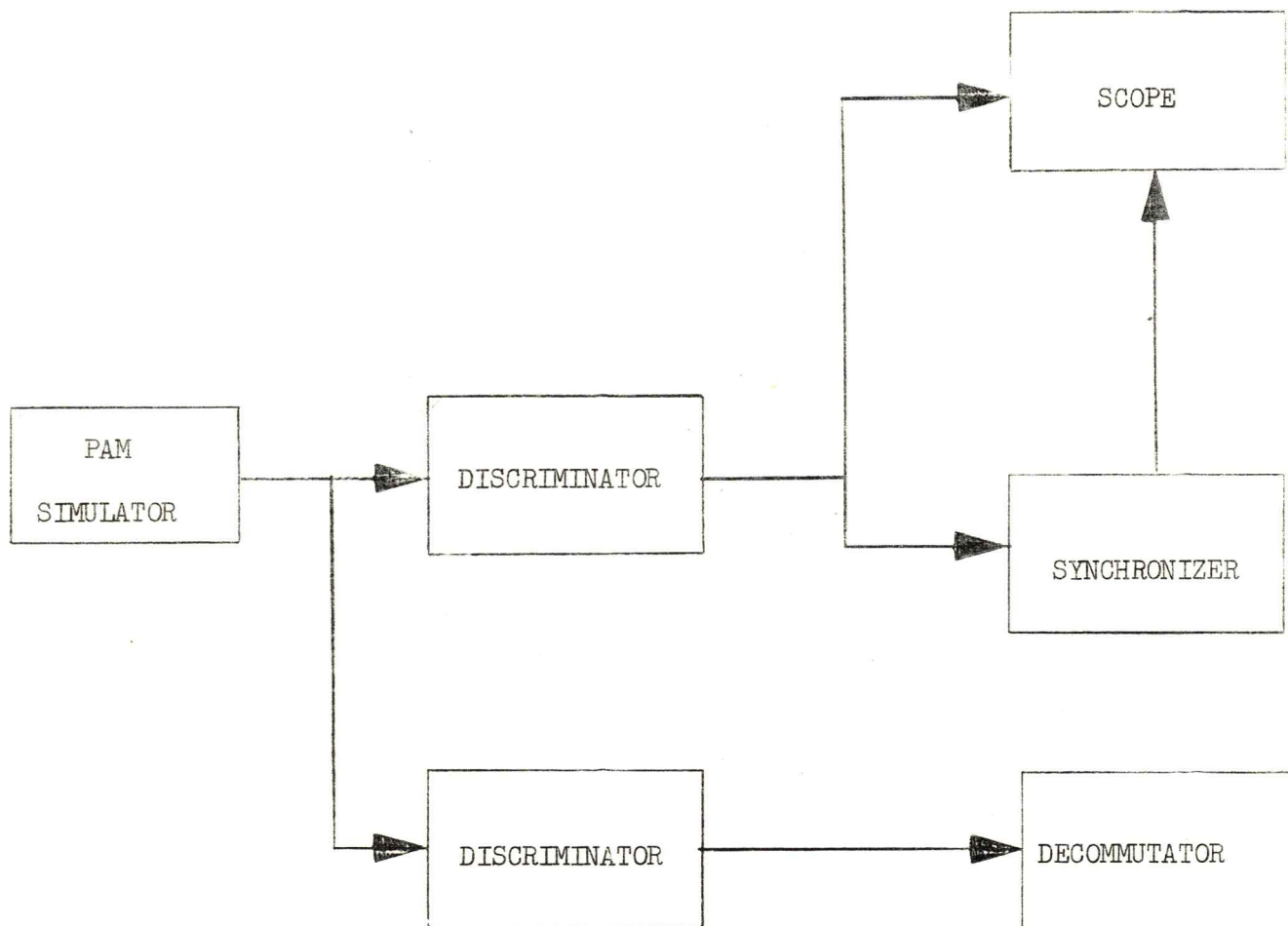


FIG. 3 - PAM SYNCHRONIZER AND DECOMMUTATOR

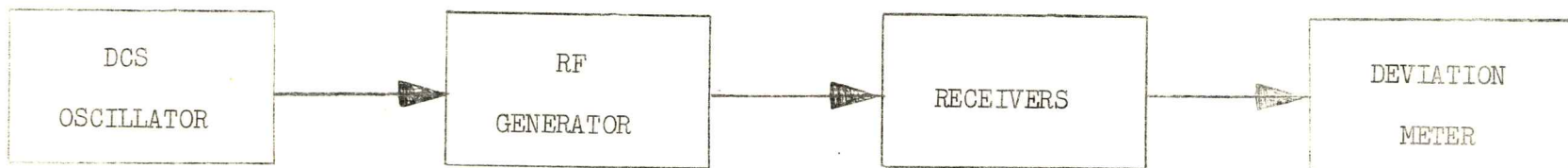


FIG. 4 - RECEIVERS

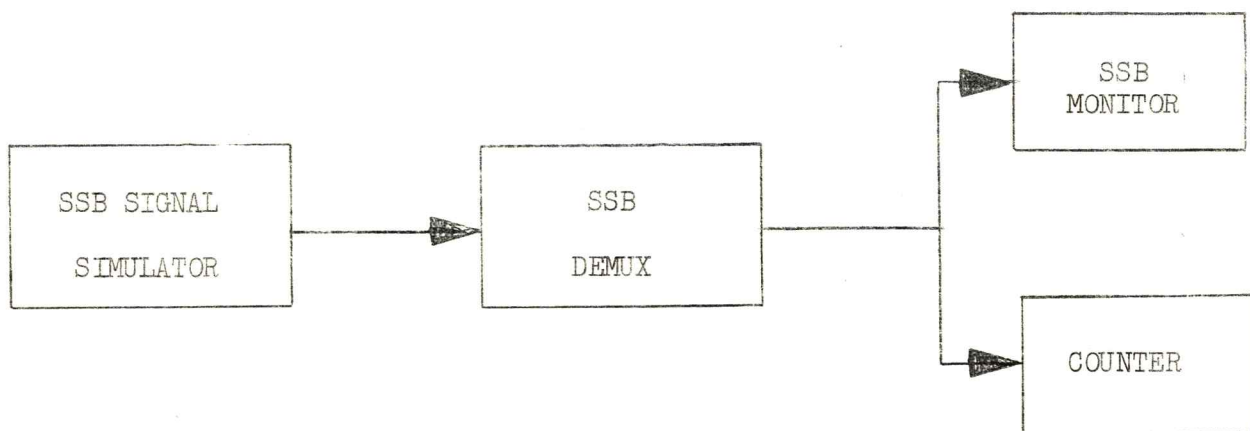


FIG. 5 - SSB DEMULTIPLEXER AND CALIBRATOR

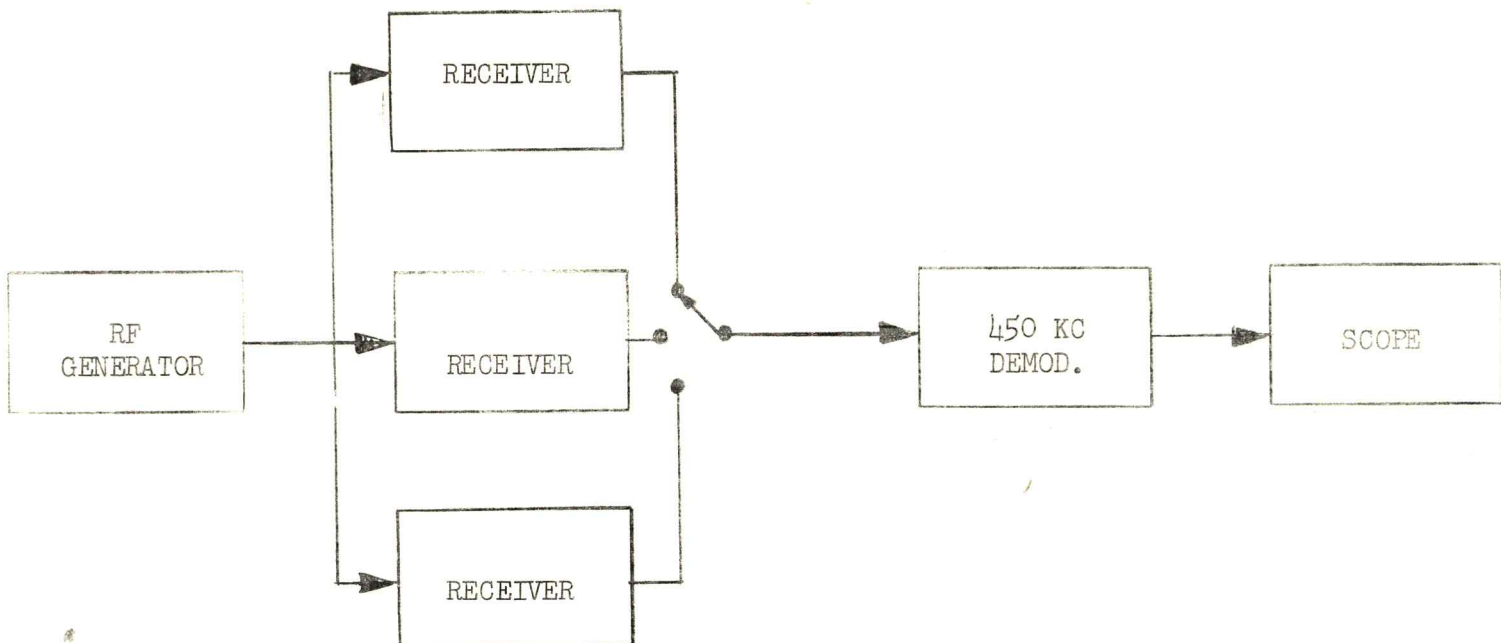


FIG. 6 - 450 KC DEMODULATORS

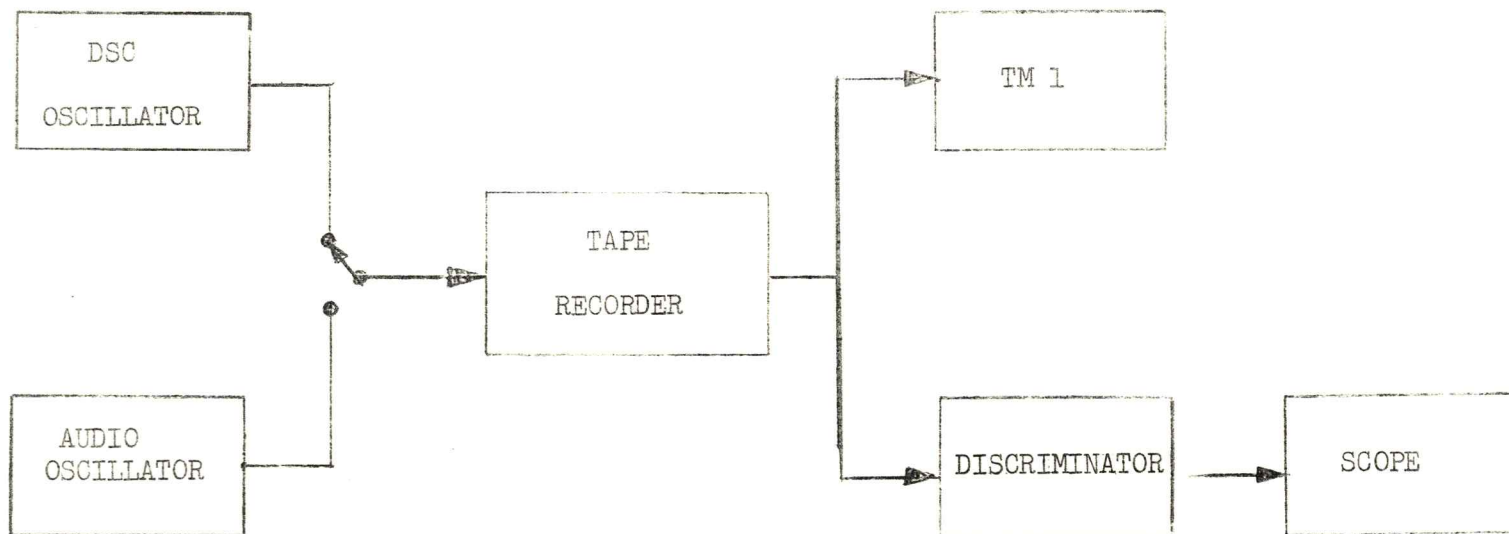


FIGURE 7
TAPE RECORDER

Launch Operations

CONTRACT NAS 8-4016